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To

Mr. Adolf Vogt

with compliments of

The Editor—

Catalogue of the Wheeler Gift of
Books, Pamphlets and Periodicals in
the Library of the American Institute
of Electrical Engineers



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Schuyler Staats Wheeler

American institute of electrical engineers. Library

*Catalogue of the Wheeler Gift of
Books, Pamphlets and Periodicals
in the Library of the American
Institute of Electrical Engineers*

EDITED BY

WILLIAM D. WEAVER

Member American Institute of Electrical Engineers

WITH INTRODUCTION, DESCRIPTIVE AND CRITICAL NOTES

BY

BROTHER POTAMIAN, Sc.D., Lond.

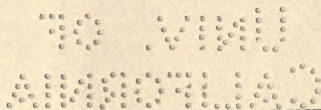
Professor of Physics, Manhattan College

VOLUME I



NEW YORK: AMERICAN INSTITUTE
OF ELECTRICAL ENGINEERS. 1909

Gen.



SCHLUETER PRINTING COMPANY
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DEED OF GIFT

TO THE COUNCIL AND MEMBERS OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS:

It is my privilege to be able to announce the completion of negotiations by which I have become the possessor of the very remarkable collection of electrical books of the late Mr. Latimer Clark of London.

My object in securing the collection was to present the books to our Institute and make it the custodian of the most complete electrical Library in the world, as well as to stimulate such interest that the Institute may in time own a permanent home in New York.

The assurance received from those who have cooperated with me in this undertaking, that the collection is very complete and includes practically every known publication in the English language previous to 1886, on magnetism, electricity, galvanism, the lodestone, mariner's compass, etc., have been more than verified by my own examination of the books since their arrival in this country. There are among its 7,000 titles many books which are not to be found in either of the famous libraries with which it has been compared, and I find that there are even some of the very earliest examples of printing.

I have always been a strong believer in the principle that every professional man is under obligation to contribute in some way to the welfare of the profession in which he is engaged, and in obedience to this idea I now desire to present

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this Library to you complete, reserving to myself only the photographs, autographs, and such duplicate books as I may add to my own collection without detracting from the completeness of the Library.

As an early contributor to the Institute and one of the original members of its Building Committee, I am interested in securing for it permanent headquarters and adding to its importance, dignity and strength. It is my desire that the Institute accept the Library and through its Library Committee and a suitable Librarian administer it in such a way as to make it generally useful, and I hope that the possession of these books will add to the Institute's prestige.

I am inclined not to suggest rules for the management of the Library, believing that those who are in charge from time to time are in the best position to know what is desirable, but in order to fix its general character, and secure its permanence, I condition the gift upon the acceptance by the Institute of the following provisions:

First.—The Library to be kept insured against loss by fire as fully as it may be practicable to determine its value, and an annual appropriation of \$1,500 to be provided for its maintenance.

Second.—A complete catalogue raisonné to be published in the name of the Institute, reciting the conditions of gift and explaining the features of interest of each book for the convenience and information of members. This catalogue to be prepared at once and a bound copy of it to be placed in the hands of each member of the Institute.

Third.—The Library to be in charge and control of a Library Board or Committee made up of members of the

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Institute and not more than a quarter of the whole number of members of this Committee to be allied with any one commercial or other interest.

Fourth.—The Library to remain in New York City and to be a reference library, free to all, including non-members and available for consultation at least three days in the week and some evenings and some Sundays, as soon as the Institute is in permanent quarters.

Fifth.—Rare books, that is, books which it is practically impossible to replace, to be exhibited under glass with suitable explanatory cards and to be subject to closer examination only at the Library and upon suitable introduction of the visitor to the Library Committee or their representative, the Librarian, and under such other precautions as will positively assure the preservation and safety of the books.

And further, it is my earnest desire that the Institute shall within five years raise a sufficient fund by subscription, and provide itself with a permanent home for its meetings and Library, and that this home shall be centrally located, reasonably safe from fire and not heavily mortgaged.

In case of the failure of the Institute to comply with the substance or spirit of these conditions, or with the desire expressed above for a permanent home, the Library shall revert to me or my heirs or assigns.

Having in view the sole purpose of encouraging the Institute to attain the position which I feel sure all of its members desire, I have sought to name conditions easily within its reach.

SCHUYLER SKAATS WHEELER.

Ampere, New Jersey,

May 17th, 1901.

PREFACE

THIS work is due to the generosity of Mr. Andrew Carnegie, who donated a fund to house, catalogue and complete the celebrated Latimer Clark collection of books, pamphlets and periodicals, presented to the Library of the American Institute of Electrical Engineers by Dr. Schuyler Skaats Wheeler. A history in detail of the acquisition of the collection and of Mr. Carnegie's gift is given in the Report of the Library Committee for 1903.¹ It is not inappropriate to recall here that it was on the day following a "Library Dinner," given February 9, 1903, by the American Institute of Electrical Engineers, at which Dr. Wheeler and Mr. Carnegie were the guests of honor, that Mr. Carnegie announced his desire to provide in New York City the building now known as the Engineering Societies' Building. In this palatial structure, of which the two upper floors are devoted to library purposes, the collection has found an ideal home.

In planning the work, and particularly in view of the requirement of the Wheeler Deed of Gift that a copy should be placed in the hands of each member of the American Institute of Electrical Engineers, of whom but a small proportion can make use of the collection at its home in New York City, it was felt that the contents should be given as much general interest as the titular scope of the book would

¹ As this Report was not published in the *Transactions* of the Institute, and also contains a history in detail of the founding of the Library, it is printed at the end of Vol. II. with the omission of the sections dealing with financial matters.

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admit. In other words, it was thought desirable to impart to the work so far as seemed feasible a direct educational value, to the end that the reader might through its pages easily trace the evolution of the electrical science and arts and form at least a passing acquaintance with the monuments of electrical literature. The character of the notes was fixed by this consideration, and in accordance with it a large number of engravings have been introduced, consisting of reproductions of significant pages of text, title pages of rare books, portraits of authors, plates illustrating epochal discoveries, etc. The admirable Introduction by Brother Potamian (Dr. M. F. O'Reilly of Manhattan College, New York City) adds in a high degree to this feature of the work, which is also furthered by an Appendix on that curious fiction of the sixteenth century, the sympathetic telegraph.

The chronological order of entries and the division into sections adopted were naturally suggested by the historical character of the collection and the special nature of some of its parts. A systematic subject classification was not found practicable for the reason that most of the books antedate any specialization in the electrical science or art. Moreover, for historical research, and especially in the early periods, a chronological arrangement has a distinct advantage where the nature of the subject matter is indicated, as in the present case, by notes accompanying the title entries. Any advantage incident to an alphabetical arrangement according to authors finds compensation in an author index, which also includes all names occurring in the titles as editor, party to a controversy or otherwise, together with all names mentioned in the annotations. Owing to the great richness of the collection in books and pamphlets relating to the telegraph, and especially to the early period of the ocean telegraph, a subject index has been provided for entries of this class.

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In making additions to his library, Mr. Latimer Clark evidently considered nothing obtainable in print should be excluded that has any relation, however slight, to the historical or technical side of electrical science or the electrical arts. This inclusiveness, which greatly enhances the value of the collection, rendered desirable some system of classification that would insure due prominence to its extensive miscellaneous portions, and also avoid what, under a strict chronological arrangement, might be the entry of an important historical work sandwiched between entries of, say, a trade catalogue and a parliamentary report. It was therefore decided to distribute the entries into sections according to certain criteria which, though far from satisfactory from a bibliographical standpoint, nevertheless appeared defensible if judged with reference to the needs of those who will make practical use of the Catalogue. Since circumstances rendered it necessary to carry out the work of classification with reference to a card transcript of titles and annotations and not from examination of the contents of each book, close scrutiny will doubtless show that some items have been misplaced. In particular, the latter method of selection might have placed in Section I. some of the entries now in Section II.

Section I., which occupies Vol. I., comprises the more notable items of the collection. Section II. consists largely of excerpts or reprints from the Transactions of learned societies, from periodicals, etc., the total of entries for this class of items being not far from two thousand. It may be added that these items, together with the pamphlets of the collection, are to be found in the Library gathered in bound volumes numbering about 200. In this section are also included a considerable number of pamphlets and some miscellaneous items, such as engravings, collections of clippings, etc. Sections III., IV. and V. comprise miscellaneous publications relating specific-

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ally to telegraphy, principally in pamphlet or circular form, and including numerous prospectuses, reports, etc., dating in the early period of cable telegraphy. Section VI. consists of reports of early electric light, telephone and electrical manufacturing companies. Section VII. relates to patent specifications and litigation. Section VIII. contains a considerable collection of parliamentary papers having an electrical bearing, and also covers legislative and legal subjects of a like nature. Section IX. comprises pamphlets, etc., relating to expositions, electrical congresses and societies. Section X. consists of entries of early electrical trade catalogues, circulars and price lists.

Much care has been bestowed on the compilation of Section XI., which is a bibliography of the sets, or partial sets, of periodicals in the collection, in number more than one hundred. The first drafts of entries in these sections were prepared from examination of the volumes and by reference to various available bibliographical sources. The drafts relating to the journals throughout the world now in existence were then submitted for revision to the present editors of these journals. The secretaries of the English, French and German electrical societies very kindly acted upon a request to have the drafts of the entries of former electrical journals printed in their languages revised by the respective librarians of such societies. In the case of British journals no longer published, the entries for those not strictly electrical in character were revised by Mr. H. M. Mayhew of the periodical department of the British Museum.

Mr. Clark took a special interest in the subject of so-called sympathetic or telepathic telegraphy, and spared no pains to make this section of his Library inclusive of the subject. In view of the completeness of this interesting department, an historical account of the idea of the sympathetic telegraph

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is given as an appendix to the Catalogue proper, together with a list of references to the more notable writings in which the subject receives notice, including some works not in the Library.

With the exception of the periodical section, in which the arrangement is alphabetical, the entries in each of the sections are, except as below noted, in chronological order according to the dates of publication. If, however, a work is represented by more than one edition, or by a translation, the chronological order is disregarded in placing such entries, which follow that of the original publication, but with the date of printing set back from the marginal date line. In the case of Peregrinus (No. 46), and of Gilbert (No. 72), and owing to the extensive collections in the Library relating to these great pioneers of electrical literature, all entries connected directly with their names are grouped under the entry earliest in date.

A very complete system of cross-references has been supplied as follows: When an author is represented in Section I. by more than one publication, the first entry under his name is accompanied by a note referring by number to *all* other entries of his work in the Catalogue. The later entries, however, are accompanied by only a single reference, this being to the earliest entry which, as noted above, is inclusive in its reference indications. Sections II.-X. have cross-references in common according to the above system, but where an author entered in any of these sections is represented in Section I., there are added the necessary cross-references. In addition to the above class of references, cross-references are included in the body of the annotations wherever by this means further light may be afforded on a work or a particular subject of interest. In brackets following the names of authors no longer living are recorded the dates of birth and

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death, except in a few cases where this information was not obtainable.

After the purchase of the Latimer Clark collection, Dr. Wheeler made a number of additions to his Gift, which are entered in the Catalogue and distinguished by an asterisk (*) following the entry number. As the Library possessed aside from the Wheeler Gift a small number of books of an historical character, these were also entered, and are distinguished by the addition of a dagger (†) to the entry number. After the text was in type some entries were added, and a few found misplaced were transferred to their proper locations, thereby necessitating the duplication of their entry numbers, as indicated by the addition of the word *bis* to such numbers. Most of the new entries are of books and pamphlets obtained—principally by gift—in order to render more complete the representation in the Catalogue of certain authors, either by their own writings or by works related thereto. To complete the record of the history of several journals, a few sets of periodicals in the Library, but not in the collection, were entered in Section XI., and are also distinguished by a dagger mark.

Owing to the duplication of entry numbers above referred to, and especially to translations and works represented in more than one edition being assigned merely the entry number of the original edition with a distinguishing affix, as well as to the exceptions noted in the cases of Peregrinus and Gilbert, the number of the final entry of the Catalogue (5966) falls short of representing the total of publications entered in the work.

It is difficult to find terms in which to express adequately the debt of gratitude that the members of the Institute owe to Brother Potamian for his devoted labor in their behalf, as represented by the descriptive and critical notes accom-

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panying the title entries of the Catalogue. The work involved in the task extended over seven years, and was performed in a spirit akin to that which animated the scholarly writers of the early periods who are so largely represented in the Library, and who had no other incentive to their sustained labors than innate love of learning and the desire to share knowledge gained with others. Works of the ages when Latin was the language of learning have become sealed books to the modern scientific man; and Brother Potamian in pointing out in detail the contributions of their writers to the body of electrical and magnetical knowledge, has not only done justice to the memory of men who were inspiring forces in their generation, but in so doing has also enabled the reader to appreciate as real personalities what otherwise might be to him mere names of the past devoid of present human interest. But delving in famous old tomes and delectable examination of the rarities of electrical literature were but incidents in the course of the work accomplished by Brother Potamian. Months and years passed in the painstaking search for hidden gems, for matter of notable interest in every book in the collection, however slight might be the promise of reward for the labor bestowed. Naturally, the result of a research of this kind, if reckoned in terms of volume, can be but slight in proportion to the time and labor spent in carrying it out. That in the present case a rich harvest of results has been garnered in will appear from the brilliant "Introduction" of Brother Potamian to the following pages, which is in itself a contribution of the highest order to electrical literature, and one also that will cause the revision of judgments on priority in various lines of electrical discovery.

Mr. Joseph Plass, of the Library of Congress, has rendered invaluable aid in preparing the matter of the Catalogue

for the printer, in taking care of bibliographical details, in typographical and critical reading of the proof, as well as in making innumerable researches, both in the Institute Library and the Library of Congress, to clear up matters in doubt. The card copy in long-hand was, after checking with originals to insure correctness of title entries, chronologically arranged and typewritten by Mr. Plass for the printer; it was then again carefully revised by comparison in doubtful cases with the originals, references and cross-references supplied and bibliographical researches made in the case of more notable works for information of interest to add relating to editions, authors, etc. Mr. Plass also prepared the first draft of the periodical section, compiled the author and telegraphic indexes and furnished the material for the Appendix on the sympathetic telegraph. These labors were accompanied by a zeal in performance and by a devotedness to the objects of the Catalogue that should not pass unnoticed, and which add to the obligation to Mr. Plass for his extremely efficient collaboration in the work.

The task of making the selections for the classification decided upon was confided to Mr. Adolph Voge of the Concilium Bibliographicum of Zurich, Switzerland, who fortunately was on a visit to this country when the matter came up for consideration. Mr. Voge must be relieved from any criticism that may be found applicable to the system of classification adopted, or arising from errors due to the manner in which circumstances required its details to be carried out.

The proof of Vol. I. of the Catalogue was read critically by Mr. Alfred W. Pollard of the British Museum, and Mr. Joseph Plass of the Library of Congress; also, by Mr. Paul Fleury Mottelay of New York, Prof. Silvanus P. Thompson of London, and Prof. Dr. G. Hellmann of Berlin, all of whom made suggestions which have greatly increased

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the value of the work. In addition, Mr. Mottelay, Prof. Thompson and Dr. Hellmann contributed additions to the collection in order to render more complete the representation in the Catalogue of some of the authors entered. As previously stated, Mr. H. M. Mayhew of the periodical department of the British Museum revised a considerable number of the drafts of entries of the periodical section, and acknowledgment is made of the courtesy in arranging for a like service in relation to other classes of periodicals, to Mr. G. C. Lloyd, secretary of the Institution of Electrical Engineers, London; Prof. Paul Janet, Director of the École Supérieure d'Électricité of the Société Internationale des Electriciens, Paris; and Herr G. Dettmar, General Secretary of the Verband Deutscher Elektrotechniker, Berlin; also, to the secretaries of other societies and to editors of various periodicals, for revising the drafts of the entries of their respective publications.

Courtesies and aid were also received from Dr. John S. Billings, Director of the New York Public Library; Messrs. H. H. B. Meyer, Charles Martell and James D. Thompson, of the Library of Congress; Mr. E. W. Nicholson, Librarian of the Bodleian Library, Oxford University; Mr. J. H. Canfield, Librarian of Columbia University, New York; Brother Chrysostem of Manhattan College; Dr. E. W. Auzal, Mr. Edward Caldwell, Mr. Charles L. Clarke, and Mr. Arthur Haas, New York City. The gratifying interest in the Catalogue and its objects shown by the several firms concerned in its mechanical execution—The Schlueter Printing Company, Gill Engraving Company, and J. F. Tapley Co. (binders), all of New York City—calls for recognition, especially as this interest was frequently manifested by services improving the book which were not covered by charges.

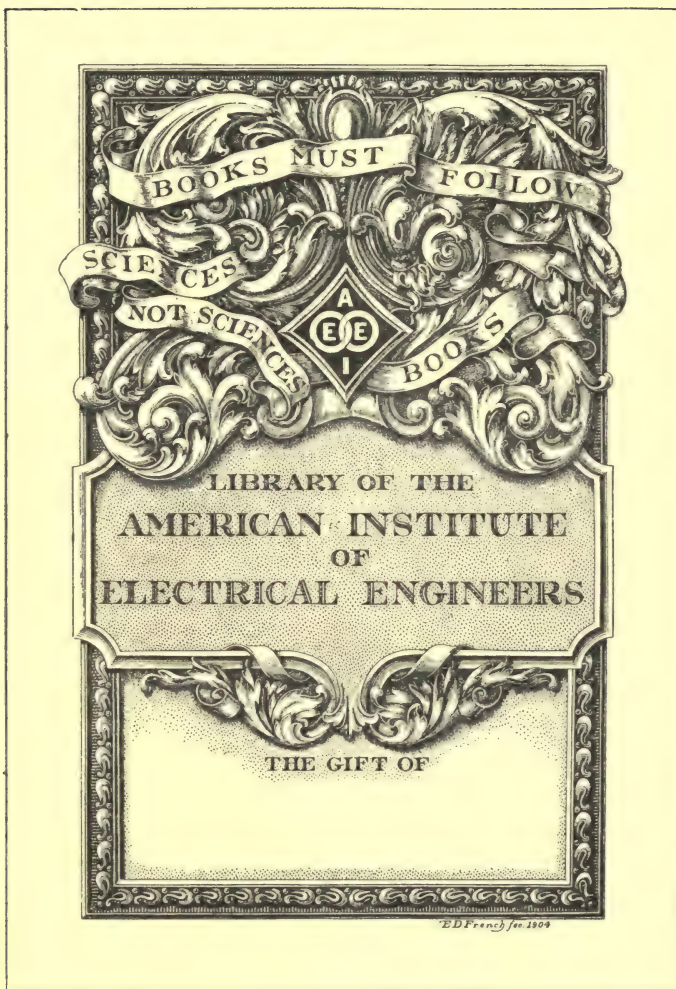
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LIBRARY BOOK PLATE
Gift of Mr. Edward D. Adams

INTRODUCTION



INTRODUCTION



THE philosopher or the essayist, writing on hobbies of a high and inspiring nature, has two recent examples at hand to illustrate his theme, viz.: the example of Sir Francis Ronalds and that of J. Latimer Clark. These distinguished men were contemporaries and friends; both long-lived, moderately moneyed, and ardently fond of old electrical books. Ronalds died at the ripe age of eighty-five, on August 8, 1873, at which time Latimer Clark had entered on his fifty-first year, and had already been collecting material for his Library for nearly a quarter of a century. He was well aware at the outset that the Royal Society had a representative collection, and that Ronalds had even a larger number of old and rare volumes on electricity and telegraphy; yet he believed that there were still many treasures on the dust-covered shelves of private collections which awaited only an appraiser and purchaser. The Library, which for years was housed at

Initial, head piece and tail piece from Gilbert's De Magnete, 1600.

Westminster and known to the electrical world as the *Latimer Clark Library*, shows how well founded was this belief. During the last forty-eight years of his life, Mr. Clark kept a watchful eye on the lists and catalogues of famous booksellers at home and abroad, and many are the anecdotes told of the patience and shrewdness which he displayed in driving a bargain for a coveted volume.

With Mr. Clark, collecting was an occupation, serious no doubt, but one destined for spare moments and vacation months. It afforded him keen pleasure to buy, to index, and to annotate. His was a hobby fraught with pleasure for himself, and fraught for all time with interest and profit for the student of electrical history.

Josiah Latimer Clark was born at Great Marlow, on March 10, 1822. Having supplemented his elementary education by a course in his favorite subject of chemistry, he obtained employment in a technical capacity with a Dublin firm engaged in the chemical industry. In 1847, encouraged by the activity in railway construction then prevalent, he determined to exchange his chemical pursuits for an appointment as surveyor on one of the numerous lines which were projected at the time. With the knowledge and experience acquired in a twelvemonth, he joined his elder brother, Edwin, who was then resident engineer on the construction of the Britannia Tubular Bridge over the Menai Strait. It was during this period that Mr. Clark gave evidence of special aptitude for applying the energy of the electric current to the purposes of life by firing a time-gun at eight o'clock every evening. Such an achievement attracted

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the notice of Mr. J. Lewis Ricardo, who offered the Clark brothers the positions of engineer and assistant-engineer, respectively, to the newly formed Electric Telegraph Company, of which he was chairman. This was in 1850; four years later, Mr. Edwin Clark resigned and his younger brother succeeded him as engineer-in-chief, a position which he held



J. LATIMER CLARK

until 1861, at which time he became consulting engineer to the Company. After 1870 his services were no longer required, as the whole telegraph business of the United Kingdom was taken over by the Government and assigned to the General Post Office Department. The twenty years between 1850 and 1870, during which Mr. Clark was connected with the Electric Telegraph Company, formed for that Company a period of continuous expansion and commercial success,

much of which must be attributed to Mr. Clark's personal influence, his inventive genius, and untiring industry.

While in the service of the Electric Telegraph Company, Mr. Clark was led to undertake a series of experiments on the flow of electricity through underground wires. As early as 1816 Ronalds, who is rightly considered the *father of the electric telegraph* in England, noticed and in 1823 clearly stated, on page 12 of his "Description of an Electric Telegraph," the *retardation* which an electric signal would undergo in passing through a long conductor; but his little pamphlet, important and suggestive as it was, attracted no attention at the time. In 1838 Faraday, commenting on Wheatstone's experiments on the "velocity of electricity," predicted that a retardation would occur on account of the electrostatic capacity of the circuit. Twelve years later, that is, in 1850, Dr. Werner Siemens, of Berlin, called attention again to this capacity-effect in a paper on testing for faults in telegraph lines, which was read before the Académie des Sciences, of Paris, on April 29 of that year. But it was not, however, until June 20, 1852, that the retardation was experimentally detected, being then observed by Mr. Clark himself on the London, Leeds, and Liverpool telegraph line. The result of the observation was withheld from the public for a time, as the Directors of the Electric Telegraph Company thought that its premature disclosure would affect their interests prejudicially. The first public demonstration was given by Mr. Clark at the Company's Gutta-Percha Works, at Lothbury, on October 4, 1853, in presence of Faraday, Airy, Edwin Clark, and other men

eminent in the scientific world. Some time later, Mr. Clark undertook, at the request of Professors Airy and Melloni, a series of researches on the electric current which showed that, contrary to the belief of the time, the rate of flow of currents through a conductor is independent of the electric pressure used; in other words, that high potential has no advantage over low potential with regard to the velocity of transmission on land lines, or even on submarine cables. Faraday tersely expressed this in a letter which he wrote to Mr. Clark, by saying "that the force of a weak battery passes with equal rapidity along the line as that of a strong battery."¹

All this seems to have been forgotten in 1858 when batteries of 380 and even 420 Daniell cells were used at Valentia to force signals through the Atlantic cable; and, on these proving unsatisfactory, recourse was had to the excessive penetrative energy of the induction coil, with the result that a cable costing millions did not long withstand the ill-advised treatment to which it was subjected.

In this connection an experimental test, made by Mr. Clark in 1866, is of special interest. Writing from Valentia, on September 12, he says: "With a single galvanic cell composed of a few drops of acid in a *silver thimble* ² and a fragment of zinc weighing a grain or two, conversation may easily, though slowly, be carried on through one of the cables (1865, 1866), or through the two joined together at Newfoundland to form a loop; and, although in the latter case the spark, twice traversing the breadth of the Atlantic, has to pass through 3700 miles of cable, its effects at the receiving end

¹ Faraday's MS. letter, *Latimer's Clark Pamphlets*, Vol. ii., p. 3.

² Signals were sent in 1866 from Newfoundland to Valentia by means of a cell consisting of a copper gun-cap with a strip of zinc excited by a drop of water.

are visible in the galvanometer in a little more than a second after contact is made with the battery. The deflections are not of a dubious character, but full and long, the spot of light traversing freely a space of 12 to 18 inches on the scale; and it is manifest that a battery many times smaller would suffice to produce similar effects."³

As might be expected, Faraday was greatly interested in the experiments on retardation which he witnessed and which he said "offered a remarkable illustration of the mutually dependent nature of induction, conduction and insulation." Accordingly, after further communication with Mr. Clark, he prepared a Friday-evening discourse on "Associated Cases of Current and Electrical Effects," which he delivered at the Royal Institution on January 20, 1854.⁴ This circumstance gave rise to the impression that the experiments referred to in the lecture had actually been made by Faraday himself on subterranean lines. An equivalent and equally erroneous statement is sometimes found in text-books, and also in scientific periodicals and technical papers.

In July, 1857, Mr. Clark invited Faraday to attend a *séance* of a spiritualistic character, which elicited from the Professor such condemnatory remarks as the following: "But how is it that the believers in these things make such a shouting-out for scientific men? Why not become scientific themselves and prove their own so-called facts as scientific men prove theirs?"⁵

To Sir George Airy, the Astronomer Royal of the time,

³ Printed letter, *Latimer Clark Pamphlets*, Vol. ii., p. 10.

⁴ *Experimental Researches*, pp. 508-517.

⁵ MS. letter, *Latimer Clark Pamphlets*, Vol. ii., p. 4.

Mr. Clark also rendered material assistance in 1857, by helping to make the necessary arrangements for the simultaneous transmission of mean solar time throughout the country from the Observatory at Greenwich. He also concurred with Prof. Airy in determining differences of longitude by means of the electric telegraph.

In the same year, 1857, Mr. Clark, having noticed a violent disturbance of magnetic needles during an auroral display, suggested to the Astronomer Royal the utility of attaching wires to magnetic observatories in the four cardinal directions, expecting them to act as antennæ or feelers of approaching magnetic storms.⁶

The insulation of air-lines attracted Mr. Clark's attention at an early period in his professional career, and led in 1856 to the invention by him of the earthenware insulator known as the "double cup invert." Two years later, in 1858, he took up the much-debated subject of the preservation of submerged cables with the result that he gave manufacturers a material, *Clark's Compound*, which was found very serviceable as a covering in extending the life of a cable. Some years later, Mr. Clark suggested the use of stamps for telegrams as practised in England; also an abbreviated code for cable messages as used throughout the world to-day.

We henceforth find Mr. Clark taking a prominent part in most electrical enterprises of magnitude. In 1859, at a period of great telegraphic depression caused by the failure of the first Atlantic cable, he was appointed engineer to the Atlantic Telegraph Company. In 1860 his name appears on

⁶ See Airy's letter, *Latimer Clark Pamphlets*, Vol. ii. p. 36.

a joint committee of the Board of Trade and the Atlantic Telegraph Company, appointed to inquire into the perplexing question of the day, the failure of submarine cables. Mr. Clark took an active part as an expert in the prolonged investigations of the committee and also in the preparation of the report itself, which document contains a great body of information on the whole subject of submarine telegraphy. The supplementary report was written by Mr. Clark himself; and in it he treats very fully of the laws which govern the propagation of electrical currents in long submarine cables.

His next communication, in the preparation of which he was assisted by his distinguished partner, Sir Charles Bright, was on "The Formation of Standards of Electrical Quantity and Resistance," and was read at the Manchester meeting of the British Association in 1861. It was a memorable and fruitful paper, inasmuch as it brought about, at the instance of Sir William Thomson (Lord Kelvin), the appointment of a committee, of which Sir Charles Bright and Mr. Latimer Clark subsequently became members,⁷ to report on the general and vitally important question of the fundamental electrical units. This was the first meeting of a committee that was destined to accomplish much in the electric and electromagnetic field; it was the initial impulse of a long-continued movement that brought renown to the whole body of English electricians. The members of the committee appointed in 1861 were Professors Williamson, Wheatstone, Thomson, and Miller, together with Dr. Matthiessen and Mr. Fleeming Jenkin. The first report was presented in the

⁷ Sir Charles Bright in 1863 and Latimer Clark in 1867.

following year, 1862; and, though dealing mainly with the unit of resistance, it virtually laid the foundation of the C. G. S. system of electric, magnetic and electromagnetic units from which followed immediately the practical units of current, resistance and capacity. It is worthy of note that not only the system of units itself, but also the very nomenclature proposed by the authors of the paper and recommended by the committee, viz.: the ohm, the volt, and the farad, met with universal acceptance, such necessary additions as the ampere, the coulomb, the watt, and the joule being made in course of time.

Among later members of the committee were Professors Clerk Maxwell, Balfour Stewart, Carey Foster; Dr. Joule, Dr. Hopkinson; Sir William Siemens, Lord Rayleigh, Sir William Preece, Sir Oliver Lodge; and Professors Adams, Johnstone Stoney, Everett, Aryton and Perry.

Mr. Clark will, however, be best remembered by the zinc-mercury standard of electromotive force which he described at length in a paper that was communicated to the Royal Society through Sir William Thomson in 1873. It cost him many months of close work involving delicate chemical manipulation and precise, physical measurements; but he was well repaid for the anxiety and labor incurred in his investigations by the high degree of constancy attained in the standard cell, which became at once an indispensable unit in every laboratory and testing-room in the world. The Clark cell was the prototype of the Weston cadmium cell which is so extensively used in national standardization institutions to-day.

CATALOGUE OF WHEELER GIFT

It was at this time that Mr. Clark called attention to the care with which shunts must be used in comparative measurements of condenser-discharges, on account of the momentary currents set up in the galvanometer-coils by the swing of the needle itself. The whole matter was closely studied by Mr. Clark and discussed in a paper which was read before the Society of Telegraph Engineers in 1873.

During the two years, 1867-1869, and again in 1879, Mr. Clark took a leading part in showing at the meetings of the British Association the unsatisfactory character of the Birmingham Wire Gauge, and it was mainly due to his efforts and perseverance that the present imperial standard was introduced and finally adopted.

In 1868 Mr. Clark published his *Principles of Electrical Measurement*, a short treatise which was well calculated to give the practical electrician clear views of the principles underlying his every-day work. Its merits were promptly and widely recognized, for in a very short time it was translated into French, Spanish, and Italian. Considerable use is made in this early work on electrical measurement of a potentiometer designed by Mr. Clark, which supplied a long-felt want for an easy and accurate method of comparing electromotive forces.

The scientific work and professional eminence of Mr. Clark were recognized at various periods of his life by his election as member of the Institution of Civil Engineers in 1861, Fellow of the Royal Astronomical Society in 1874, Chevalier de la Légion d'Honneur in 1881, and Fellow of the Royal Society in 1889.

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Though essentially a civil engineer and a practical electrician, Mr. Clark indulged in certain non-professional pursuits which afforded him congenial distraction during his leisure hours. He was a lover of flowers and a devotee of astronomy. "Hitherwood," his beautiful and spacious home at Upper Norwood, was decorated in all seasons with plants and flowers cultivated with his own hands; and, wherever he happened to be at night, the starry dome afforded him occupation as it always filled him with delight. He introduced, in 1882, a simple form of transit instrument which was mainly intended for the determination of local time, but which has also done much to facilitate and popularize this fascinating branch of knowledge, the study of the heavens.

In the practice of his profession, Mr. Clark superintended the laying of cables to Holland and Belgium, accompanied telegraph expeditions to India, and acted with Sir Charles Bright as engineer to the Anglo-American Telegraph Company when laying the cables of 1865 and 1866. It was on this occasion that Mr. Clark made the interesting test of sending signals through the united length of the two Atlantic cables, to which reference was made on page 21.

Mr. Clark left casual notes of occurrences and personal experiences in the North Sea, the Red Sea, and the Atlantic Ocean, which show some of the amenities, not to say tribulations, which an electrical engineer is liable to encounter in the discharge of his duty.

In other departments of engineering, Mr. Clark was engaged in important operations in which, together with Mr. John Standfield, he devised mammoth hydraulic hoists for use

on canals, a floating dock, and a mode of raising sunken ships. The activity of his mind in a practical direction may be gauged from the fact that the number of patents taken out by him in less than half a century amounted to one hundred and fifty, many being of acknowledged public utility.

In 1874 Mr. Clark was elected fourth President of the Society of Telegraph Engineers, the subject of his inaugural address being the early history, the progress and contemporary development of electricity and telegraphy. This address is of exceptional interest by reason of the numerous references made at first hand to the rare works belonging to the very dawn of electric and magnetic science then in the President's possession. At the conclusion of the address, Mr. Clark made the important announcement that the magnificent collection of electrical works known as the *Ronalds Library* had been transferred, in trust, by Sir Francis Ronalds to the Society of Telegraph Engineers, so that "it be not dispersed but preserved in an entire state, and be of as much use as possible to such persons as from time to time should be engaged in the pursuit of electrical science or other cognate sciences."

Throughout his long life Mr. Clark, like his friend Sir Francis Ronalds, was an ardent bibliophile, ever ready to purchase an early or rare work connected with his favorite subjects which he might not already have in his collection. He was always on the alert for sales in the book-marts of Europe, regarding which his friend Quaritch kept him duly advised. With his love for books and with means to gratify it, he succeeded in forming a Library which for the number,

importance and scarceness of some of the works on specific subjects, is unsurpassed in the world to-day. "I have been collecting everything I can find in all languages for forty-seven years," he wrote in 1897, the year before his death. "In that long time (during which I kept a skilled librarian) I succeeded in getting all English books both old and new. I also got a very large quantity of all foreign works, especially the rarer and older ones. In the line of pamphlets connected with early telegraphy my collection is quite unique, and comprehends 125 volumes. Although I still search catalogues, I rarely find anything that I have not got."

A few instances by way of illustration: Of the great encyclopedic writers of the 13th century, the Library has the magnificent folio edition of the *Speculum Naturale* of Vincent of Beauvais, printed in 1473; a Sacro Bosco (John of Holywood) *De Sphera Mundi*, 1478, the text expounded by Galileo at Padua; a black-letter folio of Albertus Magnus *De Anima*, 1494; Pliny's *Naturæ Historiarum Libri* xxxvii, 1497, with translation, 1634; Bartholomew de Glanville's *De Proprietatibus Rerum*, 1519; Friar Bacon's celebrated *Opus Majus*, written in the 13th century, and edited by Samuel Jebb in 1733; and Abbot Neckam's *De Naturis Rerum*, a work of the 12th century, edited by Thomas Wright in 1863.

The Library is exceptionally rich in tracts and treatises on the lodestone, the mariner's compass, and related subjects, from the early poems of Lucretius and Claudian to the letter which Klaproth wrote to Humboldt in 1834, and Bertelli's memoirs on magnetic history, 1868. To mention but

a few: there is the *Epistola de Magnete* of Petrus Peregrinus, the first great landmark in magnetic philosophy, written in 1269 and printed at Augsburg in 1558, with translation, 1904; Blondus *De Ventis et Navigatione*, 1546; the *Breve Compendio de la Esfera* of Martin Cortes, 1551; Porta's *Magiæ Naturalis*, 1558 and 1589, with translation, 1658; Gilbert's monumental volume *De Magnete*, 1600, with translation by P. Fleury Mottelay, 1893, and another by the Gilbert Club of London, with copious notes by Prof. S. P. Thompson, 1900; Norman's *New Attractive*, 1592—first edition 1581—containing an account of the author's discovery of magnetic dip in 1576; Borough's *Discourse of the Variation of the Compasse*, 1592—first edition 1581—in which we find the earliest published measurement of magnetic declination made on land, the credit of its discovery on sea and of its change with place belonging to Columbus, 1492; lastly, Gellibrand's *Discourse Mathematical*, 1635, which contains his discovery of the "secular" variation of declination. The "diurnal" change was observed by George Graham in 1722, and the "annual" by Jean Dominique Cassini some time between 1782 and 1791.

The idea of a region of force surrounding a magnet and the gradual development of this fundamental concept, may be traced in the Library from the elementary experiments recorded by Lucretius, 99-55 B. C., and the remarkable observations of Peregrinus, 1269, to the clear recognition by Norman in 1581 of the "Vertue in spherically forme extending rounde about the Stone (lodestone) whose center is the center of the aforesaid Vertue," which spherical space was accord-

ingly named *orbis virtutis* by Gilbert in 1600 and filled by him with rays of magnetic force, *radii virtutis magneticæ*.

From the annotations to the present bibliography, it will be seen that the Roman poet refers to the magnetic behavior not only of light iron rings, but also of iron raspings, *ramenta ferri*, while Peregrinus, and especially Gilbert, studied the nature of the force close to the surface of their terrellas by means of small magnetic needles. In 1629 Cabeo, a Jesuit of Ferrara and an investigator of remarkable ability, returned to the use of iron filings when, by plentifully sifting them over a fragment of lodestone, he obtained thick tufts at the polar ends with curved lines round the equatorial parts. The figure on page 316 of his *Philosophia Magnetica*, 1629, is the first representation of the kind that we have of the magnetic field, and as such is of special interest. Descartes extended this observation in 1650 by placing a number of small magnets symmetrically round a lodestone and noting the positions in which they settled down. The diagrams given by Descartes in his *Principia Philosophiæ* are remarkable, inasmuch as they show the continuity of the "lines of force" in the field with the lines of induction through the magnet. It is interesting to follow up this subject of the "magnetic spectrum" from Porta, Descartes, Rohault, and other early writers on magnetic philosophy to Faraday, who used the phrase "lines of force" in 1831, and Clerk Maxwell, who interpreted the "lines" mathematically in 1861.

The legendary history of the magnet as contained in the Library is abundant and amusing, including the *flesh* magnet with its extraordinary power of adhering to the skin and

even of drawing the heart out of a man; the *gold* magnet attracting to itself particles of the precious metal from an admixture of sand; the *white* magnet used as a philter; magnetic unguents of various kinds, one of which, when applied to a bald head, would make the hair grow; magnetic plasters for the relief of headaches; magnetic nostrums to cure the spleen and the dropsy, to quell disputes and even reconcile husband and wife. No less fabulous were the magnetic mountains of the North Sea to which the compass-needle was said to point, the magnetic island of the Indian Ocean which was capable of drawing iron nails from passing ships, and the suspension in mid-air of Mahomet's coffin, so often repeated by early writers on magnetic phenomena. Equally fictitious, was the pernicious effect on the lodestone of onions and garlic; and yet so widespread was the popular belief in this figment that sailors, while steering by the compass, were forbidden the use of onions and garlic lest they intoxicate the "index of the pole."

The diamond, too, played an interesting part in the evolution of magnetic theory, as a glance at the headings of certain chapters of some of the older books in the Library will suffice to show. It will be seen, for instance, that St. Augustine (354-430) records without, however, affirming that the diamond is able to rob the lodestone of its characteristic property of attraction; while, on the other hand, Porta (1540-1615) affirms that the same precious stone is capable of imparting magnetic qualities to iron needles. Gilbert (1544-1603)⁸ who esteemed his Neapolitan

⁸ For date of birth, see "The Family and Arms of Gilbert of Colchester" by Silvanus P. Thompson, F.R.S., p. 4.

contemporary as "a philosopher of no ordinary note," nevertheless suspects this view concerning the diamond to be little short of heresy, for he declares in *De Magnete* lib. iii, that he experimented with seventy diamonds in presence of many witnesses without ever obtaining the magnetic effect mentioned by Porta.

The same Gilbert denounces Pliny (23-79) whom he calls "the best of compilers" for giving currency in his "Natural History" to a magnetic fable concerning a stone said to be found in Ethiopia and called *theamedes*, which stone was credited by him with the power of repelling minerals containing iron, just as the ordinary lodestone has the power of attracting them.

The idea of using the magnetic needle for the transmission of intelligence is attributed to the celebrated Cardinal Bembo; but the credit of making this imaginary magnetic telegraph widely known belongs to his distinguished and versatile friend and countryman, Baptista Porta, who describes the manner in which two friends are supposed to convey their thoughts to each other in an instant over islands or continents, cities or mountains, ocean or desert, by means of a pair of "sympathetic" compass-needles having the letters of the alphabet written on a dial-plate around them.

If Porta were in a serious mood when he wrote this chapter of the seventh book of his *Magiæ Naturalis*, his belief in the power of occult influences must have been at least as great as that of certain telepathists of our own day. This so-called telegraph of Porta attracted general attention during his lifetime and long after, as well it might, being such a canny con-

ceit. It was disproved in 1609 by A. Boetius de Boot; celebrated in Latin verse by Famianus Strada in 1617—metrical translations by Hakewill in his *Apologie* 1630, and by Ward in *The Wonders of the Loadstone*, 1640; denounced in 1629 by Cabeo, who gives the first drawing of the telegraph on p. 302; railed at by Galileo in 1632; described in fine prose by Addison in *Spectator* 241 (1711), and in elegant verse by Akenside in Book III of his *Pleasures of the Imagination*, 1744.

References, descriptions, illustrations, approval or condemnation of the sympathetic compasses will be found in forty works in the Library, including the detailed account given by Daniel Schwenter (J. H. De Sunde) in his *Steganologia*, 1600, and an interesting form of the story by Glanvill in his *Scep sis Scientifica; or Confest Ignorance the way to Science*, 1665.

Anti-Copernican writers are strongly represented by Kircher, Cabeo, Schott, Riccioli, Leotaud, Grandami, Dechaes and Scarella. The ponderous tomes on physical and cosmical science written by these men make one wonder that the system of the world put forward in 1543 by the Canon of Frauenburg, and based by him on rather slender arguments, had vitality enough to survive the blows dealt by such a galaxy of churchmen, mathematicians, and astronomers.

Gilbert, on the other hand, was a staunch advocate of the Copernican theory, which he sought to confirm by "new and unheard-of" arguments derived from his study of the laws and phenomena of magnetism which he carried on for twenty years in his workshop at Colchester. Having shown

by original experiments and some artful argumentation that the earth acts as a colossal magnet, he proceeded to infer that its revolution is due to a "magnetic compact" or "alliance" between the sun and the earth, for "the sun itself is the mover and inciter of the universe." This magnetic theory of the movements of the various members of the solar system was, nevertheless, a very weak point in Gilbert's armor which his continental opponents were not slow in detecting, and which, together with his errors on dip and variation, they assailed with all the bolts of their well-filled quivers. The cause of Copernicanism was not served, and Gilbert's work fell into disrepute. The curious episodes of this anti-Gilbertian warfare make very interesting reading in the works enumerated above.

Verbal curiosities hastily gleaned from works in the Library would include the coinage of the term *affinity* by Albertus Magnus, *barometer* by Boyle, *gas* by van Helmont, magnetic *inclination* by Bond, electric *circuit* by Watson, electric *potential* by Green,⁹ *galvanometer* by Cumming, *electro-magnet* by Sturgeon, and *telephone* by Wheatstone. The term *electricity* occurs for the first time in Sir Thomas Browne's *Pseudodoxia Epidemica*, 1646, page 51 and the plural noun *electricities* on page 79; *magnetism* occurs in Barlowe's "Magneticall Advertisements," 1616; while *ἤλεκτρομαγνητισμός*, *electro-magnetismos*, is the astonishing title which Father Kircher gives to a chapter of his *Magnes, sive de Arte Magnetica*, 1641, beginning on page 640.

⁹ Laplace introduced the *concept* of the potential function into analytical investigations, but limited its use to problems in gravitation. Green gave the function its *name* and extended its application to electricity and magnetism.

The magnetic needle, when used by European navigators, was floated by means of straws, wood, or cork. Sometimes, too, it was laid across the edge of a light bowl which floated in water contained in a larger vessel. Abbot Neckam at the end of the twelfth century, wrote of a needle suspended on a dart (jaculum); Peregrinus introduced the double-pivoted needle in 1269; a filar mode of suspension was devised by Camillus Leonardus and described by him in his *Speculum Lapidum*, 1502. The copy of this work, which is in the Library, is dated 1610; the translation, 1750. *Stirrups* for suspending magnets appear on page 28 of Canon Tarde's *Usages du Quadrant à l'esquille ayantée*, 1638.

Two remarks of Bishop Wilkins may here be noticed. The first occurs in his *Mathematicall Magick*, 1648, and states that the "mariner's needle" may be used to steer a boat running under water—a fact which is well known to those who man our submarines. The second remark occurs in his *Mercury; or the secret and swift messenger*, 1641, and refers to a machine of which it is said: "When the friend to whom it is sent shall receive and open it, the words shall come out distinctly and in the same order as when they were spoken." This is a near approach to the mechanical reproduction of sound by our modern phonographs.

Another illustration of the aphorism *nil sub sole novi*, will be found in a passage of the *Philosophe sans Préentions, ou l'homme rare*, published in Paris in 1775, in which the impact of light or the pressure due to radiation is used for the purpose of doing mechanical work. The words of "D. L. F.," the author, are: "Observez que la percussion de la lumière

agit actuellement au-dessous de ma mécanique, c'est elle qui va m'enlever sans beaucoup d'efforts," p. 32. The work was, of course, one of pure imagination.

Of the beginnings of electricity, copious references will be found to amber and jet and their attraction for straws, chaff, and light bodies. The first original work of any extent on the general subject is Book II, of Gilbert's *De Magnete*, 1600, which, though abounding in original experiments on electrical attraction, makes no mention whatever of electrical *repulsion*. It stands out as a singular fact in the history of electrical discovery that an experimenter of Gilbert's diligence and ability should have failed to detect the mutual action of similarly electrified bodies, the discovery of that capital effect being reserved for Cabeo, who carefully describes it on page 194 of his *Philosophia Magnetica*, 1629, the description being here reproduced.

Apropos of nomenclature, Robert Symmer recognized in his *New Experiments and Observations*, 1760, that "*negative* electricity is in reality a *positive*, active power," a remark which appears to be justified by the activity and energy of our contemporary electrons, or atoms of electricity, as well as by a number of other electrical phenomena.

The evolution of the Leyden jar may be studied in the works of Winkler, of Leipzig, and Musschenbroek, of Leyden, and notably in the letters which Franklin wrote to his friend Collinson, of London, 1747-49. It is sometimes stated that Franklin was the first to ignite gunpowder by means of the electric spark, and that he did so in June, 1751. This is an error, inasmuch as Dr. Watson describes, in his

Experiments and Observations, 1746, page 40, a method which he successfully employed for firing gunpowder. Watson's book was well known to Franklin.

The development of the electrical machine may be followed from the sulphur-ball of von Guericke to the glass-globe of Newton, the glass-cylinder of Andrew Gordon, the Benedictine, the plate-machine of Martin de Planta of Sus in Switzerland, 1755, and the double-cushion plate-machine of Sigaud de la Fond, 1756. It will be seen that Winkler, of Leipzig, substituted for the palm of the hand—which was the rubber of early times—a *leather cushion*, which Canton afterwards covered with an amalgam of tin and mercury, thereby greatly increasing the output of the machine.

Among Galvani's predecessors the first place belongs to the celebrated Dutch naturalist, Swammerdam, who describes in his *Biblia Naturæ*, page 839, experiments which he made in 1658 in presence of his munificent patron the Grand Duke of Tuscany, and in which he obtained muscular contractions of *frogs' legs* by using a pair of silver and copper wires.

Analogous experiments were made in 1784, and published in 1786 by Cotugno, professor of anatomy in the University of Naples, to the effect that he felt a benumbing sensation in his hand while dissecting a mouse which had bitten one of his students; but it was not, however, until Galvani published in his *De Viribus Electricitatis*, 1791, an account of experiments which he began in 1786, that the subject of "animal electricity," as it was called, commenced to attract serious attention.

Among Volta's predecessors should be reckoned Sulzer,

the Swiss æsthetical writer who, in a paper which he sent to the Berlin Academy in 1760 entitled *Theorie der Angenehmen und unangenehmen Empfindungen*, and which was published in 1762, notes the peculiar taste produced when strips of lead and silver, lying one above and the other below the tongue, are momentarily brought into contact. See also Sulzer's *Nouvelle Théorie des plaisirs*, 1767, page 155.

Nor should Professor Robison, of Edinburgh, be forgotten, who, in 1793, constructed what he called a *rouleau*, and which was nothing else than an early form of an electric column, or "pile." "I had a number of pieces of zinc," wrote Robison to Richard Fowler, "made of the size of a shilling, and made them into a rouleau with as many shillings. If the side of the rouleau be applied to the tongue so that all the pieces are touched by it the irritation is very strong and disagreeable."¹⁰

In 1802, two years after the invention of the voltaic pile, Romagnosi, of Trent, just missed discovering the magnetic effect of the electric current. In his letter, which appeared in the "Gazetta," of Trent, August 3, 1802, he says that he connected one end of a silver chain to a battery; and having passed the other, terminating in a little knob, through a glass tube for the purpose of insulation, he brought the knob close to the extremity of an insulated compass-needle, when he noticed that the needle was attracted and, after contact, repelled.

Govi gives the letter textually in his paper, entitled: *Romagnosi e l'Elettro-Magnetismo*, 1869, remarking that the

¹⁰ Fowler: "Experiments and Observations," p. 173. See also Encyclop. Brit., 1860, Vol. i., p. 963.

attraction and repulsion said to have been observed by the experimenter, were electrostatic and not electromagnetic effects.

Mojon, an eminent professor of chemistry of Genoa, was also on the verge of an epoch-making discovery, when, in 1804, he placed steel needles for a period of twenty days in circuit with a battery of one hundred elements of the crown-of-cups type, and observed that they were permanently magnetized when removed from the circuit. See Izarn, *Manuel du Galvanisme*, 1804; also Aldini, *Essai théorique et expérimental sur le Galvanisme*, 1804.

Both Romagnosi and Mojon, however, failed to follow up the pregnant experiments which they made, thus leaving the field clear for Oersted, of Copenhagen, to announce to the world the discovery of the magnetic effect of the electric current, which he did in his pamphlet of four quarto pages printed in 1820 under the title "Experimenta circa effectum conflictus electrici in acum magneticam," a copy of which is in the Library. This capital discovery of the Dutch philosopher led Arago in France and Davy in England to magnetize steel needles by inserting them in a coil of wire conveying a current. Sturgeon, in 1825, replaced the hard steel by soft iron, and was thus the first to make an electromagnet as we know it to-day. He also applied the term *electromagnet* to the apparatus itself, a term which was adopted at once.

The student of the mathematical theory of the electrical current and its dynamical effects will be glad to have at hand Ampère's papers, 1820-25, which contain a masterly analysis of the phenomena; Ohm's "Galvanische Kette," 1827; and Green's "Essay on the application of mathematical analysis to

the theories of electricity and magnetism," printed at Nottingham in 1828. In the opinion of Mr. Clark, this Essay is "one of the most important works ever written on electricity." Copies of this (first) edition are extremely rare.

The older modes of transmitting signals by lanterns, flags, and semaphores, are fully described by the inventors of the various systems whose works are in the Library. An illustration of the scant encouragement which inventors frequently receive from people in high places will be found in the letter which Mr. Barrow wrote to Ronalds, and in which the representative of the British Government says: "Mr. Barrow presents his compliments to Mr. Ronalds and acquaints him with reference to his note of the 3rd inst. that *telegraphs of any kind are wholly unnecessary*; and that no other than the one in use will be adopted." Mr. Barrow must have forgotten when penning these lines how efficiently his mechanical telegraph worked when the result of the battle of Salamanca (July 22, 1812) was semaphored from Plymouth to London, on which occasion the message was interrupted by a fog after the transmission of the first two words, viz., "Wellington defeated." The remainder of the dispatch, "the French at Salamanca," reached the capital only on the following morning.

It must be stated that Ronalds was not the first to use static electricity in 1816 for the transmission of signals, for such a mode was suggested in the *Scots Magazine*, 1753, and carried out in 1774 by Lesage of Geneva. On page 273 of the present volume will be found a facsimile reproduction of a letter in which Ronalds refers to a proposal made in

1777 by Volta to use his electrophorus as an instrument for the transmission of signals to a distance.

As to the use of the electrical current for telegraphic purposes, information may be found in the Library on the early systems, including that of Soemmering of Munich, 1809, whose electrolytic receiver consisted of as many small voltmeters as there are letters in the alphabet. Following the discovery of the magnetic effect of the current by Ørsted in 1820, Ampère showed how the deflection of a common multiplier could be used for sending signals. In 1830, Schilling of Göttingen constructed a receiving instrument with five vertical needles, and another in 1835 with a single needle. It was one of these that W. Fothergill Cooke saw in Heidelberg in 1836 and which suggested to him the Cooke and Wheatstone apparatus of 1837. Reference should also be made to the operative bell-signal telegraph of Henry, 1832, and the needle telegraph of Gauss and Weber, 1833.

Professor Morse turned his attention, as we are told, to the subject of electric telegraphy in 1832; but it was not until 1837 that an experimental demonstration of his system was given, in which year Edward Davy publicly operated a needle-telegraph in London. The first line in the United States was opened between Baltimore and Washington in 1844, whereas the first line for public service in England was in operation between Paddington (London), and Drayton, in 1839.

Of books, pamphlets, and documents relating to land and submarine telegraphy few of any importance escaped Mr. Clark's attention. "During the first thirty of the forty years I was collecting," wrote Mr. Clark, "I secured every elec-

trical work that was published in England (including pamphlets), besides all I could hear of that were published in foreign languages. I was so lucky, too, in digging out the old books, that I can boast of possessing nearly every English work on the subject up to 1886 or 1888, after which they became painfully numerous. I have all the few very scarce and interesting sixpenny and shilling pamphlets which appeared when the telegraph first came into existence—they are now extremely rare. I have also, I think, all the scarce old histories and treatises on the magnetic needle by English and foreign writers, some of which are very interesting.”

One instance by way of illustration: the pages of *L'Illustration* for August 26, 1854, contained an article by one Charles Bourseul, of Paris, in which he claimed that the *spoken word* could be transmitted to a distance, say from Paris to Vienna, by a method which he devised involving the use of a battery, a pair of metallic plates, and connecting wires. His apprehension of the fundamental principle of the telephone was clear and accurate, and his brief description of it very much the same as we give to-day. “One person,” he says, “will have to speak to one of the plates while the other holds the second to his ear, thus enabling the former to converse as if in private with his distant friend.” “Quoi-qu’il arrive,” he prophetically concludes, “il est certain que dans un avenir plus ou moins éloigné, *la parole sera transmise a distance.*”¹¹

It does not appear, however, that this system of telepho-

¹¹ Details of the invention will be found in Du Moncel's “Exposé des Applications de l'Electricité.” Vol. iii., p. 110. Bourseul died in 1907, and for some years previously had received a pension from the French government.

ning, which antedated the experiments of Philipp Reis by seven years, and those of Graham Bell by twenty-two years, was ever put to any practical test. Reis called his instrument the *telephone*, though the term had been used by Wheatstone twenty years before.

An account of Bourseul's invention appeared in the *Didaskalia*, of Frankfort-on-Main, on Sept. 28, 1854, a translation of which, accompanied by remarks, was sent by Mr. Clark to the London *Electrician*, in the columns of which periodical it appeared on October 28, 1890.

Besides telegraphy and telephony, the early history of insulation and insulators, of electro-deposition and electromagnetic motors, is well represented in the Library.

Reference to the Clark collection was made in the Journal of *Proceedings of the Institution of Electrical Engineers*, 1899, in these words: "The Library, so far as electrical works are concerned, is unequalled. There are few, if any, works of importance missing. All are preserved and bound with the lover's conception of appropriateness and permanence, and, in many cases, they have valuable annotations regarding the significance of the facts disclosed in them."

It was Mr. Clark's wish that this valuable collection of his should eventually be transferred to the United States, inasmuch as London was already in permanent possession of the Library of Sir Francis Ronalds. Failing an American purchaser, it was to go to Japan, "a rising country which would greatly value such a unique collection." Thus wrote Mr. Clark to Mr. P. Fleury Mottelay, of New York, on February 21, 1898, eight months before his death.

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But fortunately for us the Library did not go to the land of the Rising Sun, for, thanks to the commendable public spirit of Dr. Schuyler Skaats Wheeler, it found a home in our metropolitan city.

Mr. Clark was not only an ardent collector of electrical works, but also a careful reader, annotator and critic of the books which he purchased. This gave him a rare acquaintance with the history of electrical science, which led him at different times to correct certain errors of chronology and to assign credit where it was not usually given.

When we say that Mr. Clark was a methodical and indefatigable worker, we have said enough to account for the professional, scientific, and bibliographic work which he accomplished. Though he had passed the threescore-and-ten limit, he was at his office in Westminster on Friday, October 29, 1898. This was, however, destined to be his last visit; for, on his return home, he was taken suddenly ill; and complications following, he breathed his last on October 30.

Mr. Clark was a man of uniform temperament and amiable disposition, respected far and wide for his personal qualities as well as for his engineering and scientific achievements. He had a keen appreciation of character, and was able to grasp the salient points of a question promptly. His works reveal the diligent and painstaking student; his historical criticisms and appreciations show wide research; his accuracy recalls the sixth decimal of the chemist and physicist.

In the preparation of the annotations which follow, an effort was made to draw attention to all matters of primary importance, especially in the earlier and rarer works; some

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must, however, have escaped the notice of the writer, while others may have been crowded out by the limits imposed.

To Mr. Lyonel Clark, we are indebted for several communications relative to the Library, for which we offer our acknowledgments.

The writer acknowledges with gratitude the help that he received throughout the preparation of this volume from Mr. W. D. Weaver, chairman of the Library Committee, the uniform courtesy of the members of that committee, and also the helpful remarks made on reading the proofs by Dr. Hellmann, of Berlin; Prof. Silvanus P. Thompson, of London; Mr. A. W. Pollard, of the British Museum, and Mr. P. Fleury Mottelay, of New York, whose "*Chronological History of Electricity and Magnetism*" shortly to appear in book form, was also of assistance.



SECTION I

Main Portion of Collection

SECTION I

Main Portion of Collection

1. **Vincentius, Bellovacensis** (Vincent of Beauvais.) (1190-1264.)
Speculum naturale. One vol. in two parts. Two columns to page, 66 lines to column. 367+327 l. Folio. Argentorati ["The peculiar *R* printer" (Adolph Rusch?)] *Strasburg* [1473]
 Part of a famous encyclopaedia of the Middle Ages; other volumes of which were entitled "*Speculum Morale*," "*Speculum Historiale*," and "*Speculum Doctrinale*." Book v.: Thunder, ch. 55; lightning, ch. 59; shooting-stars, ch. 72; rainbow, ch. 74. Book ix.: the magnet in general, ch. 19; magnetic quotation from St. Augustine, ch. 20; uses of the magnet in medicine, ch. 21; a species of "*adamant*" (magnet) useful in navigation for directive purposes (mariner's compass), ch. 40. As in the case of many early incunabula, no title page was printed. The date 1468 has also been assigned to the present edition. This monumental work was printed no less than ten times between 1468 (?) and 1497. (See No. 1349, Bourgeat.)
2. **Sacro Bosco, Joannes de** (John of Holywood.) (13th century.)
Spera mundi feliciter incipit, 29 l. ill. 4to. Venezia, per Adam de Rottueil. *Venice, 1478*
 The first edition of this very rare work on astronomy appeared in 1472, and continued to be the standard text-book on the subject for a long time. No reference is made either to the lodestone or to amber. Sacro Bosco, educated at Oxford, was professor of mathematics in the University of Paris some time in the 13th century.
- 2a.——*Sphaerae mundi compendium foeliciter inchoat.* 48 l. ill. & 1 pl. 4to. Venetiis, Octavius Scotus. *Venice, 1490*
 Commentary on part of Ptolemy's *Almagest*; a favorite manual with the Schoolmen; no reference to the magnet.
 —See also 17.
3. **Albertus Magnus.** (1205-1280.) *De anima libri iii. De intellectu et intelligibili libri ii.* 2+68+71+3+73+1 & 1+23+5+124 l. Folio. Venetiis, per Joannem de Forliuio et Gregorium fratres. *Venice, 1494*
 In addition to the above treatises on the soul and the intellect, this work contains four books on meteors and eight books on physics: thunder, meteors, book iii, p. 35; magnetic attraction, book vii, p. 96, and book viii, p. 113. Albert the Great was a Dominican and Bishop of Ratisbonne. Copies of this beautiful edition are very rare.
 —See also 6, 8, 19, 140.

¶ Incipit speculū naturale Vincentij beluacē
fratris ordinis predicatorum. Et primo prologus de
causa suscepi opus et eius materia. ¶ Primū.

Quoniam multitudo li-
brorum: Et tempus
breuitas: memorie
quoque labilitas: non
patiuntur cuncta que
scripta sunt poterit ai-
mo comprehendere. Mi-
hi omnium fratrum
mimo plurimorum li-
bros assidue reuol-
uent: ac longo tem-
pore studiose legē-
ti: vltimū est tantū (accedere etiam maiorū meorum
consilio) quosdam flores per modulum ingenij mei ele-
ctos: ex omnibus fere quos legere potui. siue no-
strorum. i. catholicorum doctorum: siue gentiliū scilicet
philosophorum et poetarum: et ex verisq; historicorum
in vnu corpus volumis quosdam compendio et or-
dine summatim reuigere. Ex his dūtaxat precipue que
primū videntur: vel ad fidei nostre dogmaticas astruc-
tionē: vel ad morū instructionē: siue ad excitandā
caritatis deuotionē. Aut diuinarū scripturarū mi-
sticam expositionē: vel etiā ad ipsius veritatis ma-
nifestandā aut symbolical declarandem. et ex studio
meo quasi modū quēdam imponēs curiositati mee:
ceterorumque non nullorum fidei mei similium: quorū
studij et laboris plurimos legere: eorūque flores
excerpere: per hoc vnu grācie opus: vtiq; satiffa-
cerem: et laboris mei fructū pollicēdus non nega-
rem. Siquidē facilius plures libros nullus est fi-
nis: et curiosi lectoris non satiat oculus visu: nec
auris implere auidi. Ad istud ipsi prouocauit me
plurimum falsitas vel ambiguitas quaternorum: i. que
bus autoritates sanctorū adeo plerūque mendaci-
ter a scriptoribus vel notariis inteculabantur cū
scribebantur: ut que hoc signa vel cui? auctoritatis
omino nesciret. dū (ubi grācia) que augustini vel
hieronimi erat: ascribebat ambrosio vel gregorio
vel ysidoro vel contra. Aut verborum aliqua par-
te tempta vel addita vel mutata sensus auctoris
corrumpebat. sic et de dictis philosophorum et poetarum
sic de narrationibus historicorum fiebat: dum vni?
nomen pro alio sumebatur. vel dictorum veritas
simpliciter euerdebatur. ¶ T.ij.

¶ Iterum alia causa.
Vnde dicitur pericula (iuxta danielis prophetā)
tempibus nostris non tantūmodo secula-
rium licentiarum: verū etiam diuinarū scri-
pturarum vbiq; multiplicata esse scientia. Omnes
que precipue fratres nostros assidue sacrorum librorū
historiarum ac mysticis expositionibus: insuper et obse-
curioribus questionibus: enodandis insistere. In hec
autem historicarum ecclesiasticarum quarū lacte pascēba-
tur antiquorum simplicitas: quodāmodo viluisse et
in neglectum venisse: Cum tamē non solum vici-
voluptatis ac recreandis spiritibus: verū etiam edifi-
cationis plurimū in se prouocant. Eo quod primū quod
ecclesie nascentis infanciam i apostolis describebant:
quos ipse dominus tanquam mater filios et tanquam gal-
lim pullos sub alarū suarū delicijs educauit et
fouit. Deinde vero eandem spiritum oris sui virtute

te indutam: et quasi iam in robustiorē etate per-
ueniam: non solum in ipsius apostolorum sed etiam in ceteris
martiribus eorum sequacibus per vobis in pleque
nū tempa tribulationibus exposuit. euisque paciē-
tiam in illis exercuit. Post hec autem consummata
victoria scilicet predictorum sanctorum iamque pace per co-
stantinū ecclesie reuocata: pullulantibus iterū diui-
sis heresibus videlicet arianis: donatistis: pelagi-
ana et ceteris: Sicque ad reuiniua bella ipsam ec-
clesiam prouocantibus. Ve quā gladius non vicerat
verborum fallacia subuerteret: ipsos itaque here-
ticos per doctores suos catholicos videlicet Athana-
siū Hilariū Basilium Ambrosiū Hieronimum Au-
gustinū et ceteros: vbi et scripturis preter re-
uoluit: eiusque sapientias ac si iam preter etatis esset
i eis exaucae et eliminat. Denique post huiusmodi
triumpfos ecclesie quasi iam ementa in pace quies-
cent: in sanctis personis anachoritis et mona-
chis in egipto et syria ceterisque locis orbis pluri-
bus: ad celestem et contemplatiuā vitam ascendit: si-
mulque dūtaxat ductus angelicā similitudine viuē-
di vberissima exempla reliquit. Hec et alia plura
si illis historiis velia similia et delectabilia cernēs:
plurimosque fratrum nostrorum huiusmodi rebus igna-
ros conspiciens: ipsas etiam sicut et cetera de diui-
nis autoribus diligenter excerperē collegi: acque ad
certū ordinē tempus cuncta redegi. ¶ T.ij.

De modo agendi de titulo libri.
¶ Quia autem apud me sollicitas ac studiose
inquirere: quoniam modo vel ordine cū-
cta i vnu corpus aptius cōpingere:
cernens quod si diuersorum sententias ad eandem mare-
riā pertinētes (ut fieri soleo) per singulos titulos an-
notarem (Verbi gratia) sub vno titulo sententias
et exempla de caritate: sub alio de castitate & sic
de ceteris vtiq; et vicijs singillatim tractādo per-
cederem: totam rerum naturā quā nichilo-
minus describere diligenter disposui: necessarium ab
hoc opere non excluderem. necnō et de ordinē po-
tius historie non parum utilitatis et pulchritudinis
habentē omnino deseruerem & euerterem. Consi-
deratis omnibus preteritōrem procedendi modum
nullatenus reperi quod istū (quē per cunctis elegi) vi-
delicet ut iuxta ordinē sacre scripture primo de
creatoris: postea de creaturis: postea quoque de la-
psu et reparandis hominibus: Deinde vero de rebus
gestis iuxta seriez tempus suorum ordinare. differre-
rem. In fine vero totū operis singulas et prece-
las ad idem pertinētes per singulas materias quibus?
das titulis et notulis decorare. Denique (quoniam
ut supius dictum est) ex diuersis autoribus hoc
opus preteritū est. ut sciat quid cui? sit: singu-
lorum dictis eorum nomina annotari. ac ne facile
transponderetur de locis proprijs: neque i margi-
ne sicut sit i psalterio gloriose et epistolis pauli
et in sententijs: sed iter lineas ipsas (sicut fecit gre-
gorianus in compilatione canonū) ea inserui. Inter
etiam ea que ipse vel i maioribus meis sed more
nostro doctoribus dicitur: vel in quorundam scriptis
notabilia reperi: nomie meo id est auctoris scitu
laui. Illud autē lectorem non lateat: non nulla in
hoc opere maxime que de gestis sanctorum martirū
et confessorū non ita penitus abbreviata esse: vti
volui. quia nimirū alijs quoque studijs per obedi-
entiam occupatus et inuenit: non omnia manu
propria: sed plerūque per manus notarios abbreviaui.

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4. **Plinius, Caius Secundus.** (23-79.) *Naturae historiarum libri xxxvii, e castigationibus Hermolai Barbari quam emendatissime editi.* 254 l. Large folio. Venetiis, per B. Benalium.
Venice, 1497
Celebrated work on natural history; references to thunder and lightning, book ii., ch. 45; rainbow, book ii., ch. 61; the lodestone, book xxxvi, ch. 16.
- 4a.— **English translation by Philemon Holland, 2nd edition, vol. 1.**
Folio. London, A. Islip. London, 1634
Statue in mid-air, 575; Ethiopian repelling magnet, 587; the lodestone, 587.
5. **Leonardus, Camillus.** (Flour. 16th cent.) *De sestertio pecuniis ponderibus et mensuris antiquis, libri duo.* 36 l. 4to. (1510?)
Treatise on ancient moneys, weights and measures.
—See also 54, 83.
6. **Albertus Magnus.** (1205-1280.) *De natura locorum Librum mira eruditione et singulari fruge refertum et jam primum summa diligentia reuisum, in lucem editum quem leges diligentius si uel cosmographia uel physica profecisse te uolueris.* Viennae, Austriae. 52 l. Sm. 4to. *Vienna, 1514*
Tract on physical geography. Ch. v. contains reference to magnetic attraction and repulsion; ch. vii., to the flesh magnet and magnetic mountains, both of which were magnetic myths. Scarce.
—See also 3.
7. **Cusa, Nicolaus de.** (1401-1464.) *Haec accurata recognitio trium voluminum operum.* 3 vols. in 1. Folio. Parisiis, ex officina Ascensiana. *Paris, 1514*
Very rare work of the learned Cardinal, containing references to the attractive power of the magnet, vol. i, fol. 96, and vol. ii, fols. 86, 123, 125. This work contains description of first known *hygroscope*.
8. **Albertus Magnus.** (1205-1280.) *De mineralibus - - - libri quinque.* 57 l. 4to. Augustae Vindelicorum. *Augsburg, 1519*
The author quotes Aristotle freely, refers to the lodestone, and alludes to the danger caused by submerged magnetic rocks to ships containing iron nails. In Book ii., tract 3, ch. vi., he quotes Aristotle to the effect that some lodestones attract gold, silver, copper and tin, while others attract the *flesh and bone* of man—one of the current magnetic myths.
—See also 3.
9. **Glanvilla, Bartholomaeus de.** (14th century.) *Opus de proprietatibus rerum.* 192 l. Folio. Nuremberge, Joannis Koberger.
Nuremberg, 1519
Cyclopaedia which was very popular in the 14th, 15th and 16th centuries; the author was a Franciscan friar and member of the family of the Earls of Suffolk. He wrote about 1250. The first edition with a date appeared in 1480. The book was translated into most European languages. Book xvi, ch. 63, contains references to iron rings suspended from a magnet; a statue suspended in mid-air by magnetic attraction (a myth). Book xi., ch. 13, treats of thunder, and ch. 14, of lightning.
10. **Augustine, Saint.** (354-430.) *De civitate Dei.* 11 l.+787 pp. Folio. Basileae, apud J. Frobenium. *Basle, 1522*
The author of this famous work describes on p. 714 how a scrap of iron resting on a silver dish follows a lodestone moving under the dish; p. 720, a lodestone attracts iron but not straw; p. 718, in a certain temple (of

infinitum motum esse: non eundem quidem numero:
 nec alterum post alterum: et alterum cuius altero finis
 est infinitum mouentium: et eorum que mouentur: ita quod mul-
 ta et infinita sunt mota persequetur. et simul habebit motus
 sicut etiam accidere videtur in his que nunc dicta sunt
 sic ergo forte respondebitur et instabit nobis aliquis.
 Sed contra hoc dicimus quod si nos supponamus per se
 predicta: quod id quod mouetur primum et mouetur alia per
 locum corporale mouetur: et necesse est quod omne quod
 mouetur quod necesse est igitur per consequens conti-
 nuum esse suo moueri quod moueri supponitur: eo quod
 mediatum ens id aliquid ipsum tangat: et tactus in ma-
 teriis ordinat et in phisicis ordinat ad vnum: sicut videmus
 contingere in omnibus phisice mouentibus et motis:
 tunc impossibile erit quod ex omnibus vel infinitis que mo-
 uentur a se invicem supponamus fieri vnum: aut coniungens
 aut continuus: quod nos superius iam diximus quod nos non
 loquimur hic de mobili tractato ad materiam: et ideo
 etiam diximus supra: quod omne mobile est diuisibile: non
 tamen elementum quod est mobile est et non sit diuisibile: quod
 diuisibile est elementum finis quod est mobile: non tamen di-
 uisibile finis quod est hoc mobile ad materiam contractum:
 et ita dicimus quod omne mobile inquantum mobile conti-
 nuabile est cum omni mobili inquantum est mobile: et si ac-
 cipiat continuus cum ipso nihil debet sequi impossi-
 bile. Accipiamus igitur quod pingat vnum fieri corpus ex
 omnibus illis que possumus esse infinita: et sit illa ma-
 gnitudo siue continuus infinitus signatus per a. b. c. d. et
 motus qui congregatus ex omnibus motibus particula-
 rum continuorum sit signatus per e. g. h. et non est differ-
 entia quo ad propolitus nostrum: siue sit quilibet magnitu-
 do sigillata finita: siue infinita: vnum modo infinite ponit
 finem numeri: quod siue numero siue alio modo sit semper
 copositus est infinitum quod copositus ex infinitis per nu-
 merum: siue finis infinitum finis ultimi: siue finita: sicut etiam
 in phisicis est offensum. Conuenit finem vnum similitudi-
 nis quod cum istos ponatur et in tempore finito moue-
 bitur infinitum quod in coponentibus finis ultimi: aut est
 finitum: aut infinitum: licet numero componenda semper sint
 infinita: et vtrumque hoc est impossibile: sicut in sexto de
 claratu est: ibi enim probauimus quod motus infiniti est in-
 finitus: eo quod motus vnum est essentialiter habet diuisiones
 finis diuisione eius quod mouetur: et tunc eius quod est
 infinitum in coponentibus motus est infinitus: quia non
 finitur transitus eius. Cum igitur impossibile sit motum
 hoc modo infinitum esse in tempore infinito: et sequitur
 hoc ex illa positione que dicitur abire in infinitum: si vnum
 ponitur moueri ab alio. Necessarius est ergo quod sta-
 bit aliquando si vnum mouetur ab alio: ita quod aliquid sit
 primum mouens: ita quod ipsum ab alio nullo mouetur: opo-
 tet igitur per istam rationem esse aliquid primum quod
 mouetur a mouente primo. Si autem forte aliquis di-
 xerit quod ista demonstratio non valet: quod non concludit sim-
 pliciter: sed concessio quod a falso: hoc est quod oia moue-
 ntia et mota continguntur: vel continentur. Dicemus quod
 non impedit nostram demonstrationem: quod licet hoc sit
 falsum finis corpora phisica in specie et forma accepta:
 tamen est possibile et contingens finis genus mobilis in ge-
 nerali est mobile ut diximus. Quod autem possibile et co-
 tingens supponit licet sit falsum nihil debet sequi im-
 possibile: hoc autem sequitur impossibile: ideo non sed/
 tur hoc ex assumpto falso: sed potius ex positione illa
 qua ponitur abire in infinitum et vnum semper mouetur
 ab alio. Et etiam aduertendum quod cum nos in tali ordine
 mobilium et motorum probauimus esse aliquid pri-

mum mouens non intelligimus hoc de primo quod
 est finis mouens intentionem efficientem: quia finis est
 cuius causa sit totum quod sit ab efficiente: sed intelli-
 gimus de primo quod est efficiens vnde est principium
 motus quod mouet et operatur ab hoc quod motus fiat: et cu-
 tus actus est motus in eo quod motus. Hic enim mouens si/
 mul tempore est mouens cum eo quod mouetur: ita quod nihil est
 medium ipsorum: hoc enim verum est quod talis motor immedia-
 tus est ei quod mouetur in omni eo quod mouetur et mouetur: et
 hoc vocari quiddam esse loci ex loco: quod in eodem loco:
 et ubi est motor et id quod mouetur.

Cap. liij. quod iter motoris et id quod mouetur nihil est me-
 dium in omnibus modis motus locali.

Ita autem nos in demonstratione predicta sup-
 posuimus ex omnibus motoribus et motis si in
 genere considerentur fieri vnum: et hoc non potest
 esse nisi immediata sint motoris et id quod mouetur: ita quod inter
 ea nec plenum sit nec vacuum: oportet nos hic determinare
 nare quod inter motoris et id quod mouetur ab ipso nihil sit
 medium finis omni motu in genere. Quia autem per se ma-
 nifestum est quod inter generans et generatum et proximum ni-
 hil est medium: quia virtus formatiua que est proximum
 generans est in femine: ideo non oportet nos multum
 sollicitari ut probemus in generatione corruptione
 ne que est generationi contraria sed nos probabimus
 hoc in his in quibus est occultum. Quoniam autem
 tres sunt motus ut diximus in quinto: quorum vnum
 est finis quilibet locum: et alter finis qualitates: tertius
 finis quantitates. Necesse est etiam quod ea que mouentur mo-
 uentur ad res trius generis: et necesse est motus. Tres esse
 finem genera. Vnum igitur qui est finis loci est loci mu-
 tatio: qui non finis qualitatem est alteratio: que non finis
 quantitatem est augmentum vel decrementum. Dicamus
 igitur primum de loci mutatione: hic est enim finis
 naturam primum motus: sicut probauimus in octauo
 huius scientie. Dicamus igitur quod omne illud quod
 fertur finis locum: aut mouetur ipsum a seipso: aut ab
 altero quod est extrinsecum ei. Si autem mouetur a
 seipso sicut animalia mouentur: vel per se videtur
 moueri sicut elementa: tunc manifestum est quod motus
 simul cum talibus et in seipso mouentibus habent in
 se mouens: et ita simul erit mouens et quod mouetur:
 ita quod inter ea nullum est medium: neque plenum: neque
 vacuum: quia cum in principio libi probatum sit quod
 omne quod mouetur habet motorem: oportet et quod si/
 lud quod mouetur et non habet motorem extra: ha-
 beat eum in seipso: et ita habet eum coniunctum sibi/
 ne medio. Quod autem mouetur ab alio mouetur qua-
 drifarie: omnes enim motus violenti qui motoris ha-
 bent extra: ad quatuor modos communes reducun-
 tur. Modi autem illi sunt vocati pulsio: tractio: et ve-
 ritio et vertigo. Omnes enim alios modos motus vio-
 lenti necesse est in hoc reduci: et contingere aliam ra-
 tionem istorum: sicut inferius ostendemus. Pulsio autem
 etem diuiditur in duos modos speciales: quedam enim
 pulsio est impulsio: quedam vocatur expulsio. Et
 impulsio quidem est quando id quod mouetur non de-
 sinit ab eo quod impellitur: sed corporaliter coniungit
 ei per totum spacium: et per totum tempus impul-
 sione: sicut si manu superposita super lapidem lapi-
 dem impellam ita quod manus a lapide non separetur:
 tunc manifestum est quod mouens et motum coniungun-
 tur sine medio. Alius autem motus pulsione est ex-
 pulsio. Expulsio autem est quando pellens desinit ab eo
 quod pellitur: et hoc est quando primum tangens mouens

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Alexandria) lodestones were fixed in the roof so that an iron statue remained suspended in mid-air. This is one of the magnetic myths that enjoyed currency for many centuries. (See No. 47b.)

11. **Vegetius, Renatus Flavius.** (4th century.) *De l'arte militare.* Novamente tradotta. 99 l. 16mo. Vinezia, per B. di Vitale.

Venice, 1524

Early work on military tactics; no reference to electric or magnetic matters.

12. **Marbodeus.** (1035-1125.) *De lapidibus pretiosis enchiridion, cum scholiis Pictorii Villingensis. Eiusdem Pictorii de lapide molari carmen.* 55+1 l. 12mo. no pl. (Parisiis, C. Wechelus.)

Paris, 1531

Collection of Latin poems principally on gems. Two of them are of special interest, viz: the one on *jet* beginning folio 28, and the other on the *lodestone*, fol. 41. An English translation is printed in King's *Precious Stones* (London, 1870). Marbodeus (Marbceuf) was Archbishop of Rennes in Brittany.

—See also 40.

13. **Finæus, Orontius.** (1494-1555.) *Protomathesis: opus varium ac scitu non minus utile quam jucundum nunc primum in lucem feliciter emissum.* 8+207 l. ill. Folio. Parisiis. *Paris, 1532*
Treatise on arithmetic, geometry and cosmography. The last part of the work treats of the construction of clocks. The illustrations are numerous.

14. **Peurbach, Georg von.** (1423-1461.) *Novae theoriae planetarum.* 40 l. ill. 12mo. Venetiis, per Melchiorrem Sessa. *Venice, 1534*
Pamphlet on the motion of the planets highly considered in its time.

15. **Stoeffler, Johann.** (1452-1531.) *Variorum Astrolabiorum compositio seu fabrica necnon eorundem usuum ac variarum utilitatum explanatio.* 8 l.+77 l. ill. Folio. Moguntiae, P. Jordan.

Mayence, 1535

Compendium of astronomy printed eight years before the death of Copernicus.

- 16.* **Mela, Pomponius.** (Flour. 1st cent.) *De situ orbis, libri tres; cum annotationibus Petri Joannis Oliuarii Valentini,* 110 pp. Lutetiae. Ex. officina Christiani Wecheli. 12mo. *Paris, 1536*
Famous work on geography written in the first century of the Christian era.

—See also 80.

17. **Mauro, Fiorentino.** (1494-1556.) *Sphera volgare novamente tradotta* (from the Latin of J. de Sacro Bosco), con molte notande additioni di geometria, cosmographia, arte navigatoria, et stereometria, proportioni et quantita delli elementi, distanze, grandeze, et movimenti di tutti li corpi celesti. 56 l. ill. 4to. Venetia, B. Zanetti.

Venice, 1537

This treatise was published six years before the death of Copernicus. The earth is represented in one of the chapters p. 12 as the center of the universe round which revolve the sun and planets. The mariner's compass is represented on the title-page which also contains a globe with the name *Ametrica* written for *America*. Page 57 has another globe with the name properly written. A meridian line with compass occurs on p. 61 and again on p. 84; see also p. 95.

—See also 2.



9. GLANVILLA. (Reduced.)

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- 18.* **Strabo.** (66-28 B. C.) *Geographicorum libri xvii.* - - - item, epitomae eorundem decem & septem de geographia librorum. 44 l.+549 pp.+12 l. Folio. Basileae, apud Joan Vualder.
Basle, 1539
The world as known to the ancients; celebrated work of the eminent Greek geographer.
19. **Lully, Raymond.** (Raymundus, Lullius.) (1235?-1315.) *De secretis naturae siue quinta essentia libri duo.* Accesserunt Albertus Magnus, *De mineralibus et rebus metallicis libri quinque.* 4+183+4 l. ill. 12mo. Argentorati, apud Balthasarum Beck.
Strasburg, 1541
This volume contains a work of Lully, the Enlightened Doctor, on medical subjects and of Albertus Magnus on minerals. Properties of rubbed lyncurius, l. 106; the lodestone, l. 107; the flesh magnet, l. 107; other magnetic myths, l. 107. Lully was the author of more than 400 works.
—See also 3.
20. **Hartmann, Georg.** (1489-1564.) *Nine Astronomical charts.* sq. 4to.
Nuremberg, 1542
The charts are not accompanied by text. Hartmann, vicar of the church of St. Sebaldus, Nuremberg, wrote a letter to Count Albert of Prussia, dated March 4, 1544, in which he clearly recognizes magnetic inclination, or dip. The letter remained unpublished for nearly 300 years and could not have been known to Robert Norman when he discovered the dip of the magnetic needle in 1576 and which he records in his *Newe Attractive*, 1581. See No. 66 (Ed. 1592). Hartmann was in Rome in 1510, where he found the *declination* to be 6° E. This is probably the earliest determination of magnetic declination *on land*; its discovery *on sea* is due to Columbus (Sept. 13, 1492), to whom we also owe the discovery of its variation with change of place. According to Hellmann's *Rara Magnetica*, the first *printed record* of magnetic declination is that of Francisco Falero in his *Tratado del Esphera*, an exceedingly rare book published in 1535. See also Bauer's "United States Magnetic Declination Tables and Isogonic Charts," 1902.
21. **Ulstadius, P(hilippus).** (Flour. 16th cent.) *Coelum philosophorum seu secreta naturae.* 8 l.+95 l. ill. 12mo. Parisiis, apud Viuntium Gaultherot.
Paris, 1544
Collection of medical prescriptions. First-edition, Freiburg, 1525.
22. **Apianus, (Bienewitz) Petrus.** (1495-1552). *Cosmographia* - - - 3+66 l. ill. & charta cosmographica opera Aeg. Diesthemij. Antwerpiae, 4to.
Antwerp, 1545
This treatise on cosmography enjoyed a high reputation in the 16th century; the first edition appeared in 1524. The word compass, *compassus*, occurs on fol. 10 and again on fol. 20. The illustration on fol. 10 shows a compass, one pole of which is connected by a dotted line with the pole-star. Fol. 30 contains a chapter on America in which Americus Vespucius is mentioned but Columbus is ignored. There are several interesting sectional (movable) figures.
23. **Pontano, Giovanni Giovano.** (1426-1503.) *Liber de meteoris cum interpretatione Viti Amerbachii.* 10 l.+225 pp.+3 l. 12mo. Argentorati, apud Cratonem Mylium.
Strasburg, 1545
Collection of 49 poems on natural phenomena, such as hail, rainbows, comets, winds, earthquakes, effects of thunder. Hallam considers Pontano one of the finest Latin poets of the fifteenth century.

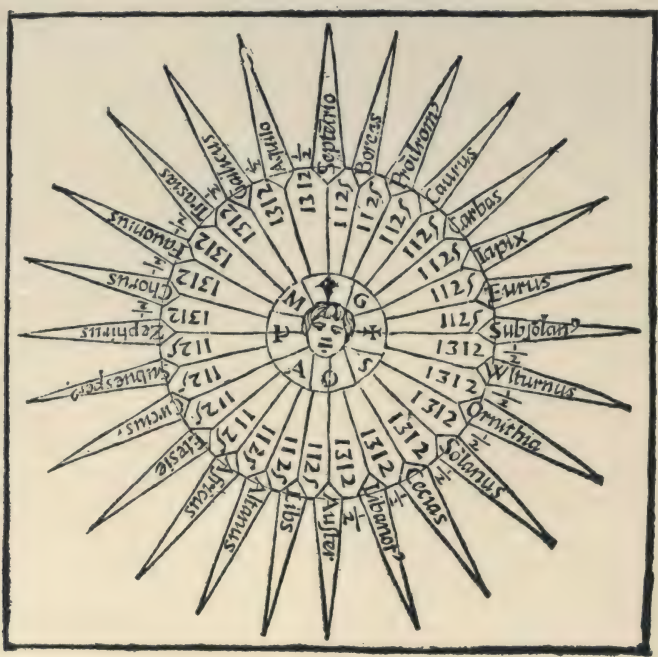


17. MAURO. (Reduced.)

CATALOGUE OF WHEELER GIFT

24. **Blondus**, Michael Angelus. (1497-1560.) De ventis et navigatione - - - cum accuratissima descriptione distantiae. 18 l. ill. 4to. Venetijs, Montisferrati. *Venice, 1546*
The writer gives on fol. 14, ch. xxiii., a careful description of the compass including theory and rules for use. The compass is called on fol. 15 *pixis* or *buxolus*, *cf.*, the French *boussole*. Very rare.
25. **Alexander** Aphrodisiensis. (End of 2d century.) Quaestiones locorum interni maris, & oceani, a Gadibus ad novum orbem naturales; de anima, morales; sive difficilium dubitationum & solutionum libri iiii. 8 l.+297 pp.+3 l. 12mo. Basileae, per Joannem Oporinum. *Basle, 1548*
This ancient work contains a chapter purporting to show why a magnet attracts iron.
26. **Aristoteles**. (384-322 B. C.) Commentarii in physicam Aristotelis. 7+293+27 l. 12mo. (Title page lacking.) *1548*
Reference, p. 187, to "electrum vel succinum" (amber).
—See also 31.
27. **Affaitato**, Fortunio. (?—1550.) Phisicae ac astronomicae considerationes. 36 l. 12mo. Venetius, apud Nicolaum de Bascarinis. *Venice, 1549*
Fancied reference to *magnetic dip*, fol. 10; clear statement of declination, fol. 11; magnetic attraction discussed, fols. 20-25. This is a copy of the first edition, which is extremely rare.
28. **Aurifaber**, André. (1512-1559.) Succini historia. MS. translation of chapter VIII. 2 l. Folio. *Konigsberg, 1551*
A few quaint remarks on amber and the lodestone.
29. **Cortes**, Martin. (?—1582.) Breve compendio de la sphaera y de la arte de nauegar con nuevos instrumentos y reglas exemplificado con muy subtiles demonstraciones. 95+3 l. ill. pl. 8vo. Sevilla, Anton Alvarez. *Seville, 1551*
A salient feature of this early work on navigation is a chapter beginning on fol. 72 in which the magnetic declination is discussed; fol. 61 shows a circular diagram with radiating lines, 32 in number, corresponding to the points of the compass; fol. 69 has a chapter on the properties of the lodestone and the manner of making ships' compasses.
30. **Encelius**, Christoph (Entzelt) (?—1583.) De re metallica, hoc est, de origine, varietate, et natura corporum, metallicorum, lapidum, etc. libri iiii. 8 l.+271 pp. ill. 12mo. Franc(ofurti), apud Chr. Egenolphum. *Frankfort, 1551*
Work on metallurgy; reference to the magnet, p. 173; to jet, 181; and to amber, 194.
31. **Aristoteles**. (384-322 B. C.) De anima libri tres. Joanne Argyropylo Byzantio interprete. 93 pp.+1 l. 12mo. Lugduni, apud T. Paganum. *Lyons, 1554*
Latin translation by Argyropylos; reference to the lodestone, lib. i, p. 11.
- 32.—De coelo libri quatuor, Joanne Argyropylo Byzantio interprete. 115 pp. 12mo. Lugduni, apud T. Paganum. *Lyons, 1554*
Argyropylos, the accomplished translator of this work on motion, the earth and elementary bodies, died in Italy about 1490.

transfretates, tuto nauigabunt obseruantes instrumentum hoc nostre descriptionis, Vtrūque enim polum poterunt seruare ad dimidium oceani, ad nouum orbem descendentes, polum arcticum, ascendentes uero ad nos, Antarticum, cum suis spiritibus scriptis secundum ueram distantiam, quoniam si protensum esset mare uel planum & terra spherica ut ait Manilius uel Cilindrica non esset, unius poli obseruatio non sufficeret, sed quoniam hæc spherica sunt uel cilindrica Ideo utroque polo egent nauigantes & obseruatione stellarum, cum autem immensa distantia sit maris nec terra semper conspicitur uel discernitur, currauimus, diligenter uobis exponere ut específicos uentos comprehendetis, quibus uersus quamque regionem tutius nauigaueris, Nam cognitis spiritibus uela tendentibus noscitur a prudentibus quo nam ueliuolant, propterea hortamur uos omnes nauigantes ut non nobis sed alijsimo tantum referatis gratias, in huius noui pixidis descriptione, quo duce nauigabitis tutius quam hactenus fecistis, seruauit. n. Deus hoc, usq; ad hæc tempora, quo indies eius memores existatis, diligētes ipsum, quia & ille uos plurimum dilexit.



PIXIS uel Buxolus instrumentum & dux nauigantium.

24. BLONDUS. (Reduced.)

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- 33.—De generatione et corruptione libri duo, Francisco Vatablo interprete. 67 pp. 12mo. Lugduni, apud T. Paganum.

Lyons, 1554

Properties of elementary bodies; the translator was François Vatable, a French priest, who died in 1547.

- 34.—Meteorologicorum libri quatuor, Francisco Vatablo interprete. 136 pp. ill. 12mo. Lugduni, apud T. Paganum. *Lyons, 1554*
Treatise on general meteorological phenomena; translated by Vatable.

- 35.—Physicorum Aristotelis, seu de naturali auscultatione, libri octo. Joanne Argyropylo Byzantio & Francisco Vatablo interpretibus. 215 pp. 12mo. Lugduni, apud G. Rovillium.

Lyons, 1554

Treatise on physics. Bound in are two sheets of illuminated MS.

- 36.—De sensu et sensili, memoria et reminiscentia, somno et vigilia, insomniis, divinatione in somno, longitudine et brevitate vitae, iuventute, et senectute, et vita et morte, et respiratione, Francisco Vatablo interprete. 111 pp. 12mo. Lugduni, apud T. Paganum. *Lyons, 1554*

Tracts on the senses, memory, sleep, old age and death, translated by Vatable.

—See also 26.

- 37.* Cardano, (Girolamo). (1501-1576.) De subtilitate, libri xxi. 12 l.+561 pp. ill. portr. Folio. Basileae, apud Ludovicum Lucium.

Basle, 1554

Famous work of the celebrated Italian physician, mathematician and writer on physical science. Gagates, 157; amber, 158; difference between electric and magnetic attraction, 158; different classes of magnets, 213. First edition, 1550.

- 37a.—Another edition. 718 pp.+29 l. ill. sm. 8vo. Lugduni, apud Gulielmum Rovillium. *Lyons, 1559*

Cardan is known to mathematical readers by his method of solving cubic equations. In this treatise on the *Subtily of Things*, the author gives his views on the lodestone in book viii. On p. 278 he refers to magnetic declination, saying that the pole-star is *five parts* to the east of the pole of the world.

- 37b.—Les livres de H. Cardanus intitulés de la subtilite, etc., subtiles inventions ensemble les causes occultes et raisons d'icelles. Traduit du Latin en François par R. le Blanc. 4 l. +391 l.+26 l. ill. 4to. Paris, Foucher. *Paris 1556*

Translation by Richard Le Blanc. On fol. 147 it is stated on the authority of Albertus Magnus that Aristotle was acquainted with the *boeste nautique*, the mariner's compass. The hyacinth (stone) is said, fol. 132, to afford complete protection against lightning. The phenomena of thunder and lightning described on fols. 387, 388.

—See also 45, 79.

38. Belon, Pierre. (1517-1564.) Les observations de plusieurs singularitez et choses mémorables, trouvées en Grèce, Asie, Judée, Egypte, Arabie & autres pays estranges, &c. 4+275+33 l. ill. 12mo. (Title page missing.) Anvers, chez Chr. Plantin.

Antwerp, 1555

Fol. 162 contains remarks on the use of the lodestone for navigating purposes; on fol. 238 the statement is made that when yellow amber is rubbed,

AD PAVLVM. III.
PONTIFICEM FORTVNATISSI

*um Optimum Maximumq̃, Fortunij Affaytati
Phisici, atq; Theologi, Phisicæ ac Astro-
nomicæ cõsiderationes. Quarum
Catalogus uersa paginis
conspicitur.*



VENETIIS M D XLIX
CVM PRIVILEGIO.

27. AFFAITATO.

CATALOGUE OF WHEELER GIFT

it attracts iron as the lodestone does, fol. 317; also the usual reference to the suspension of Mahomet's coffin.

- 39.* **Fracastoro**, (Girolamo). (1483-1553.) Opera omnia, in unum proxime post illius mortem collecta - - - accesserunt Andreae Naugerii patricii Veneti, orationes duae carminaq nonnulla. 6+285 pp., portr. 4to. Venetiis, apud Juntas.

Venice, 1555

Astronomical, metaphysical and especially medical subjects. References to magnetic and electric attraction; attractive property of rubbed diamond. The author was poet, physician and philosopher; the volume includes his extraordinary poem *de morbo gallico*.

40. **Marbodeus**. (1035-1123.) Dactylothea. - - - nunc altera vice, supra priorem aeditionem illustrata. Item de lapide molari et de Cote carmen panegyricum, eodem autore Georgio Pictorio. 8 l.+80 pp. 12mo. Basileae, per Henrichum Petri.

Basle, 1555

Poem on jet (gagates), p. 40; on the magnet, p. 55; rare.

—See also 12.

41. **Medina**, Pedro da, (about 1493—?) L'arte del navegar, in la qual si contengono le regole, dechiarationi, secreti & auisi, alla bona nauegation necessarij - - - tradotta de lingua Spagnola in volgar Italiano - - - (da Vincenzo Paletino da Corzula.) 12+cxxxvii+2 l. ill. diagrams and full page map of the new world. Venitia, G. Pedrezano.

Venice, 1555

The sixth book treats of the mariner's compass, here called "Bossolo da Navigar"; map of America on fol. xxiii; elaborate compass-card, fol. cviii. The author denies the *variation* of the compass. Medina was special examiner of Spanish pilots, and the map here included is highly valuable. The first section is dated 1545.

- 42.* **Naugerius**, Andrea. (1483-1529.) Orationes duae habitae; una in funere Bartholomaei Liviani, altera in funere Leonardi Lavretani Venetiarum principis, carminaq nonnulla. 32 pp. 4to. Venetiis, apud Haeredes Lucaeantonii Juntae.

Venice, 1555

Two funeral orations.

- 43.*—**Lusus**. Venetiis, apud Haeredes Lucaeantonii Juntae.

Venice, 1555

A metrical composition on *Sport*. The above two works are bound with No. 39.

44. **Agricola**, (Landmann) Georg. (1494-1555.) De re metallica libri xii. 5 l.+538 pp.+36 l. ill. Folio. Basileae, Froben.

Basle, 1556

First great work on metallurgy, remarkable for its numerous and quaint illustrations. Slight references to amber and the lodestone pp. 27, 194, 471.

45. **Cardano**, Girolamo. (1501-1576.) De rerum varietate libri xvii. 16 l. +1194 pp.+32 l. portr. 8vo. Basileae, H. Petri.

Basle, 1557

Describes, p. 656, a method of obtaining the continuous motion of an iron pointer over a circular lodestone; *cf.*, Peregrinus, ch. ii.; he states, p. 1059, that some magnets attract silver. Portrait of Cardano, aged 49, on title page. —See also 37.

Une compendio de la sphaera y de la arte de
nauegar/ con nuenos instrumentos y reglas/ exemplificado
con muy subtiles demonstraciones: compuesto por **Martin**
Cortes natural de burjalaroz en el reyno de **Aragon** y de
presente vezino de la ciudad de **Ladiz**: dirigido al inuictissi-
mo Monarcha **Carlo Quinto** Rey de las **Uespañas** etç.
Señor Muestro.



29. CORTES. (Reduced.)

CATALOGUE OF WHEELER GIFT

46. **Petrus Peregrinus.** (Flour. 13th cent.) *De Magnete, seu rota perpetui motus, libellus.* Divi Ferdinandi Rhomanorum Imperatoris auspicio, per Achillem P: Gasserum, L: nunc primum promulgatus. 28 l., 4 engravings. Sm. 4to. Augsburgi in Suevis.

Augsburg, 1558

This, the earliest work on the magnet, was written in the form of a letter by Pierre de Maricourt (Petrus Peregrinus) to a friend of his in Picardy. It was dated from the French camp before Lucera (Italy), August 8, 1269. The thirteen chapters into which the letter is divided form the most original, extensive and important treatise on the magnet prior to Gilbert's *De Magnete*, (No. 72). Gilbert was well acquainted with the letter of Peregrinus. This is a copy of the first printed edition, of which only eighteen are known. It includes a list of books that deal with the subject of the magnet. A reprint based on Bertelli's version appears in Hellmann's *Rara Magnetica*, Berlin, 1898. In 1900, Quaritch of London printed a fac-simile in colors (50 copies) of a MS. written about A. D. 1390, and owned by Prof. S. P. Thompson. The *Epistola* was plagiarized by Taisnier (See No. 53), a translation of whose book into English was made by Richard Eden, and printed in 1579.

- 46a.†—Photographic reproduction of MS. in Bodleian Library, Oxford. (MS. Bodl., No. 7027.) 13 leaves.

This is a fine fourteenth century MS. folio, of 13 leaves, 9x11 inches written in Gothic letters in two columns of thirty-five lines each. It is rubricated in red and blue throughout. There are two finely drawn diagrams, corresponding to Figs. 2 and 3 of Gasser's edition. The Manuscript does not say when or where written.

- 46b.†—Prospectus of an edition of 300 numbered copies (150 for America) of the earliest work of experimental science: The Epistle of Pierre Pelerin de Maricourt, to Sygur de Foucaucourt, soldier, on the lodestone. Charles S. Peirce. 16 pp. Sm. 4to.

(New York, 1892)

Announcement of the proposed publication of a translation by the author, of the *Epistle* from the Paris MS. (Codex P, collection 7378 A; see Libri, No. 939). Two pages of the Latin text are printed line for line in special type made in Paris, and accompanied by translation and notes. Several pages are devoted to quotations (in Latin and in English) from Roger Bacon relating to Peregrinus. The publication of the work was abandoned.

- 46c.†—Epistle of Petrus Peregrinus of Maricourt, to Sygerus of Foucaucourt, soldier, concerning the magnet. Silvanus P(hillips) Thompson. 16 l. Sm. 4to.

London, 1902

A translation into English based upon Gasser (1558), Bertelli (1868) and Hellmann (1898), amended by reference to a MS. of A.D. 1390 owned by the translator. The initials are supplied by hand, and the copies (250) are rubricated throughout. Privately printed in Caxton type, at Chiswick press.

- 46d.†—The letter of Petrus Peregrinus on The Magnet, A. D. 1269. Translated by Brother Arnold, M. Sc. With introductory note by Brother Potamian, D. Sc. 19+42 pp., illus. 4to.

New York, 1904

The introduction to this handsome edition traces the history of the lodestone down to the time of Peregrinus. An appendix of five pages gives interesting notes on early references to the mariner's compass.

*Hippocrâtes et
Aeron medici
Athenas à peste
liberarunt.*

*Cur succinum
paleas trahat.*

dulce, & optimè olens, ad eò ut suffitum in conclauius contra pestem c
(iuuat enim) ad tertiam usq; diem conclaue olere bene faciat. Omne enim bene olens dum suffit, uapores absumendo corruptos, aerem ab omni uitio liberat: liberant ergo magis, quæ magis fragrant, & quæ tardius consumunt: quæ uerò calida & sicca sunt, uapores celerius absumunt. Ob id magnus ignis præstantissimum est auxilium aduersus pestilentem aeris statum, ut etiam flabella: uiciant enim aerem uapores, tum natura loci ex quo eleuant, tum quia Solis radios penetrare prohibent. Ob id referunt in Germania uallem Ioachimicam cum ob syluas densas & stagna inhabitabilis esset, deriuatis aquis in cuniculos ac fossas, succisq; nemoribus, salubrem factam esse. Itaq; nil mirum est, duplici auxilio flagrans succinum aerem emendare, tum quia siccum, tum quia bene olens. Ita uidentur bis olim Athenæ ignis beneficio à duobus medicis Hippocrate & Acone peste liberatæ, flammis scilicet bene olentium lignorum, non quidem mediocribus, sed maximis. A mediocribus enim ignibus, & minime odorata materia succensis, tantum abest ut pestilens aer emendetur, tum magis si beneficium uentorū absit, ut etiam uehementer exacerbetur. Quamobrem Thucydides refert, cum ob multitudinem cadauera rogis imponerent, non parum auctam pestilentiam. Manifestum est igitur, eisdem penè causis succinum eidem morbo medicamentis immixtum, plurimum conferre. Miscetur enim aut propter odorem, aut siccandi causa, aut, quod euidentius est auxilium in eo, attrahendi: trahit enim omnia leuia, paleas, festucas, ramenta tenuia metallorū, & ozimi folia, perperam contradicente Theophrasto. Causa est huius, quod humidū habeat pingue & glutinosum, quo emissio res sicca combibere cupiēs, uersus fontem, id est, succinū ipsum mouetur. Omne enim siccum postquam humidū combibere coeperit, ad ipsum etiam fertur, ut etiam ignis ad pabulum: unde si fricetur uehementius, etiam trahit ob calorem. Neq; enim lapidis Magnetis & succini eadē trahendi ratio: nam succinū omne leue trahit, Magnes ferrum solum. Succinum interposito corpore non mouet plaeam, Magnes ferrum. Succinū non trahitur uicissim à palea, Magnes trahitur à ferro etiam. Palea à succino in nullam partem dirigitur, ferrum modò ad Boream, modò ad Austrum contactu Magnetis tendit. Deniq; succini attractio calido & frictione iuuatur multū, Magnetis eo solum quod purior pars lapidis redditur. Quid tandē? succini attractio haud dubiè est similis illi, quæ à cucurbitula ab igne & cæteris calidis, ob pingue illud calidum innarum, quod etiam adhærens parietibus, ut dixi, conclauias etiam in tertium diem bene olere facit. Est enim in omni bitumine humidū pingue calidum, ob quod etiam facile ardet. Sed in trahendo inter bitumina succinum, inter succini genera cinereū, quod citra ostium Vistulæ ad Pucecam in litore maris effoditur: hoc enim, ut Agricola refert, dum ferro attereret, folia ex humo ad duos pedes in sublime ad

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- 46e.†—Petrus Peregrinus—Author of the earliest treatise on the magnet, A. D. 1269. By Brother Potamian. (Extract, Electrical World and Engineer, Vol. 43, pp. 514-515, March 12, 1904.) 8 pp. 8vo. *New York, 1904*
- 46f.†—Petrus Peregrinus de Maricourt and his Epistola de Magnete. By Silvanus P(hillips) Thompson, D. Sc., F.R.S. (Extract, Proceedings of the British Academy, Vol. II., 1906.) 32 pp.; fac-simile of page of MS. 8vo. *London, 1906*
The paper contains an account of 28 MSS. and of 11 printed versions (in whole or in part) of the Epistola and the location of the 18 copies known to exist of the 1558 (Gasser) edition.
- 46g.†—Petrus Peregrinus, the earliest of magneticians. By Brother Potamian. (Electrical World, Vol. 49, pp. 504-595, March 23, 1907.) Ill. Folio. *New York, 1907*
General account of the life and magnetic work of Petrus Peregrinus, Pierre de Maricourt.
—See also 463, 540a.
47. Porta, Giovanni Battista della. (1538-1615.) *Magiae naturalis sive de miraculis rerum naturalium libri iiii.* 8 l.+163 pp. Folio. Neapoli, apud Matthiam Cancer. *Naples, 1558*
This famous work on "Natural Magic" was published when the author was only sixteen. He extended the matter in subsequent editions, particularly in that of 1589. (See No. 64.) Pp. 88-90, sympathetic telegraph.
- 47a.—Another edition. 8+135 pp.+1 l. 12mo. Antverpiae, ex officina Christophori Plantini. *Antwerp, 1560*
Book treating of natural wonders. Reference to magnets, p. 74; on p. 75 we read: "quod magnes ferrum, arenam, oleum, et omne traheret."
- 47b.—Another edition. 9 l.+135 pp. portr. 12mo. Antverpiae, ex officina Christophori Plantini. *Antwerp, 1561*
Pages 74 and 75 treat of the effects of the lodestone, some of which are fanciful; its uses in navigation are stated as also why the magnet points to the north; the author records the magnetic experiment related by St. Augustine in his *De Civitate Dei* and refers to the statue containing iron "in capite" said to be suspended in mid-air in the temple of Serapis. (See No. 10.)
—See also 64, 67.
48. Pedemontani, Alexius. (— — —) *De secretis libri sex, mira quadam rerum varietate referti ex Italico in latinum sermonem nunc primum translati per Joannem Jacobum Weckerum.* 8l.+279 pp.+12l. Sm. 8vo. Basileae. *Basle, 1559*
Chiefly a collection of medical prescriptions.
49. Taisnier Jean. (1509-1602.) *De usu sphaerae materialis, hactenus ab omnibus philosophis & mathematicis magno studiosorum incommodo neglecto nunc vero in lucem tradito.* 4l.+46 pp. Sm. 4to. Coloniae, excudebat Joannes Bathenius. *Cologne, 1559*
Work on astronomy by the Belgian mathematician, famous in its time.

LIVRE II. DES SINGVLA. CHAP. XVI.

Que les mariniers nauigeoyent anciennement
sans l'aiguille & quadran. & sans auoir
vsage de la pierre d'Aimant.



LE S anciens auoyent plus grande difficulté en leurs nauigations que nous n'auons maintenant : car lors n'en paix, n'en guerre ils n'auoyent adresses, sinon de la conjecture de l'Orient, Soleil couchant, Septentrion, & Midy : ou des estoilles & Soleil qu'ils veoyent de jour & de nuict, & le plus souuent ne perdoyent point la terre de veue. Mais maintenāt que tout le monde ā cogneu la vertu de la pierre de l'Aimāt, la nauigation est si facile, que deux hommes osent s'auenturer ā tous propos avec vne petite barque, ā tous heurts, aux plus impetueux vents, & trauerfer la mer: ce que les anciēns n'eussent osé faire n'y entreprendre en plain jour, lors qu'ils n'auoyent l'aiguille & quadran frottée avec la pierre d'Aimant. Ceste est la pierre autrement nommée Lapis Herculeus, ou Magnes, & Sideritis, & en Italien Calamita : en laquelle lon trouue vertus cōtraires: car l'un des bouts fait que l'aiguille regarde en tout temps la partie de Septentrion, & l'autre bout le Midy. Nous trouuons que ccluy qui inuenta premiereement l'vsage de ladicte pierre, auoit nom Flauus. Mais le premier qui ait escrit de telle vertu, c'est Albert le Grand : lequel
ayant

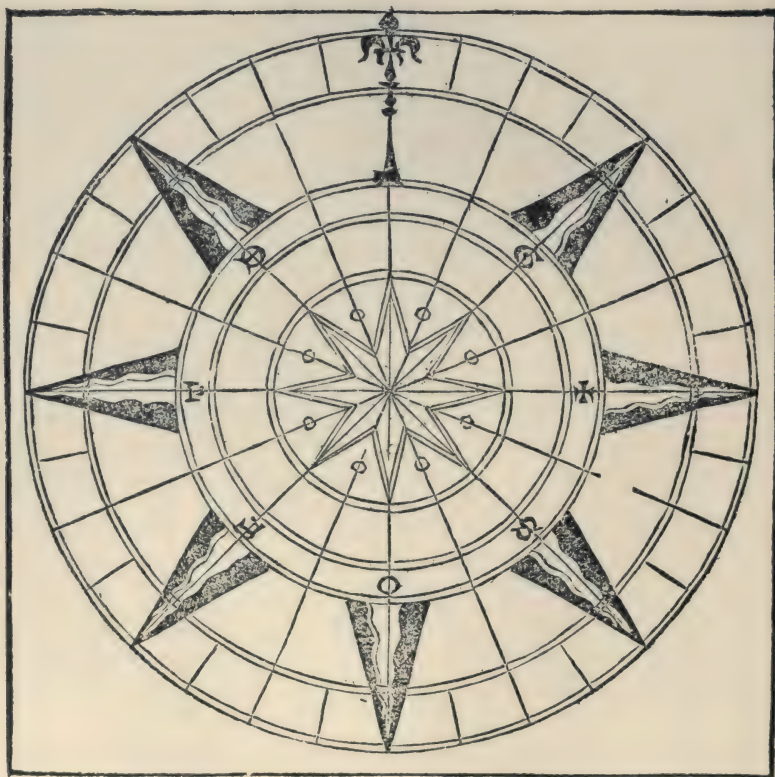
Pierre
d'aimant

Lapis her-
culeus.
Magnes.
Sideritis.
Calamita.

CATALOGUE OF WHEELER GIFT

- 50.—De annuli sphaerici fabrica & usu, libri tres geometrici, omnibus mathematices. - - - 27 pp.+3 l. ill. 4to. Antverpiae, in edibus Joannis Richardi. *Antwerp, 1560*
Treatise on globes and problems on general astronomy.
—See also 53.
- 51.* **Carpentarius, J(acobus).** (— — —) Descriptio universae naturae. 2 vols. in 1. 4to. Parisiis, ex officina G. Buon. *Paris, 1562-1566*
Metaphysical treatise followed by a brief description of the animal and vegetable kingdoms.
52. **Ptolemaeus, Claudius.** (2d century.) Geographia. Olim a Bilibaldo Pirkheimherio translata, at nunc multis codicibus graecis collata et redacta a Jos. Moletio. 4 l.+286+64 pp.+32 l. 64 maps. 4to. Venetiis, apud Vincentium Valgrisium. *Venice, 1562*
To the great work of the Alexandrian astronomer and geographer, have been added eight maps of America besides others of northern Europe.
53. **Taisnier, Jean.** (1509-1562.) Opusculum perpetua memoria dignissimum de natura magnetis, et ejus effectibus. 2 l.+84 pp.+1 l. ill. 2 portr. Sm. 4to. Coloniae, apud Joannem Birckmannum. *Cologne, 1562*
The first 15 pages of this rare work refer to the lodestone, its properties and uses, taken without acknowledgment from the *De Magnete* of Peregrinus. Figures of floating lodestones; the usual form of the compass needle. (See No. 46.)
—See also 49.
54. **Dolce, Lodovico.** (Also Dulci.) (1508-1566 (?) 1569.) Libri tre; nei quali si tratta delle diverse sorti delle gemme che produce la natura. 99 l. 12mo. Venetia, Gio. Battista. *Venice, 1565*
Work on precious stones; plagiarism from Camillus Leonardus; (see No. 5.)
55. **Claudianus, Claudius.** (4th Century.) Opera, Theodori Pulmanni diligentia, et fide summa, e vetustis codicibus restituta. Accedunt ad Claudiani opera Martini Antonii Del-rio notae. 353 pp.+3 l.+80 pp.+2 l.+29 pp.+1 l. 12mo. Antverpiae, ex officina Chr. Plantini. *Antwerp, 1571*
Contains a celebrated poem of 57 lines on the lodestone, beginning p. 322. The lodestone is not found among the ornaments of kings or women, but is eagerly sought for by those acquainted with its power; the statue of Mars contains iron, that of Venus the magnet. This idyll, it is said, suggested to the Italian Jesuit, Favianus Strada, his famous poem on the magnet published in his *Prolusiones Academicæ*, 1617. (See No. 90.)
—See also 72a.
- 56.* **Titelman, F(rancis).** (16th Century.) Naturalis philosophiae compendium, sive De consideratione rerum naturalium libri xii. 248 pp.+12 l. 12mo. Venetiis, apud Joann. Antonium Farreum. *Venice, 1571*
Principles of metaphysics; reference to magnetic attraction, p. 136.

CVIII
LIBRO SESTO
DELLA AGVGGIA, OVER
BOSSOLO DA
NAVIGAR.



41. MEDINA. (Reduced.)

CATALOGUE OF WHEELER GIFT

57. **Avianus, (Flavius).** (Flourished about 150 A.D.) *Aviani Aesopicarum fabularum liber, a Theod. Pulmanno ex membranis in lucem editus.* 29 pp.+1 l. 16mo. Antverpiae, ex officina Christofori Plantini. *Antwerp, 1572*
Latin poet who wrote in elegiac verse a number of fables after the manner of Aesop.
58. **Biringuccio, Vanucci.** (End of the 15th—middle of the 16th Century.) *La pyrotechnie; ou, Art de feu, contenant dix livres. Traduite d'Italien en François par Jacques Vincent.* 4 l.+168 pp. ill. 4to. Paris, Claude Fremy. *Paris, 1572*
On page 56 of this book on Pyrotechny will be found an account of numerous extraordinary properties attributed to the lodestone in some of which the author expresses his belief. The original edition appeared in Venice, 1540.
59. **Lemnius, Levinus.** (1505-1568.) *Occulta naturae miracula, ac varia rerum documenta, probabili ratione atque artificio connectura explicata.* 8 l.+473 pp.+11 l. 12mo. Gandavi, ex officina G. Manilij. *Ghent, 1572*
Wine spoilt by lightning and thunder, p. 272. The compass is called, p. 304, *pixidecula nautica, vulgo Compas.* First edition, Antwerp, 1559.
60. **Maurolycus, Franciscus.** (1494-1575.) *Opuscula mathematica.* 11 l.+285 pp. ill. 4to. Venetiis, apud Fr. Franciscum Senensem. *Venice, 1575*
Work of merit on astronomy and geometry by a Sicilian Abbot. The orientation of the magnet is referred to p. 100, *et seq.* The writer argues that the needle does not point due north but to a magnetic island mentioned by the Swedish prelate and historian, Olaus Magnus.
- 61.† **Besson, Jacques.** (1540-?.) *Theatrum instrumentorum et machinarum Jacobi Bessoni Delphinatis mathematici ingeniosissimi cum Franc. Beroaldi figurarum declaratione demonstratum. (text in French.)* 20 l. 60 plates (plates 49-56 missing.) Folio. Lugduni, apud Barth. Vincentium *Lyons, 1578*
Full-page illustrations of various mechanical devices. Besson was a French mathematician and inventor.
62. **Camorano, Rodrigo.** (— - — .) *Compendio de la arte de navegar.* 4 l.+60 pp. 1 plate, 1 portr. 4to. Sevilla, A. Pescioni. *Seville, 1582*
Compass-card with 32 radial lines, p. 9; rotation of the pole-star round the axis of the world, p. 29; chapter on the compass, p. 34, with diagram showing the use of two rectangular axes for suspension.
63. **Rao di Alessano, Cesare.** (16th Century.) *I meteori. I quali contengono quanto intorno a tal materia si puo desiderare.* 16+167 l. 4to. Venetia, Gio. Varisco. *Venice, 1582*
L. 131, causes of lightning and thunder; different kinds of thunder, color of lightning-flashes also why lightning precedes thunder, and whether it always does so. L. 134, places and seas in which lightning is most frequently seen. L. 135 contains an account of the effects of lightning together with protection against the same. Aristotle is frequently quoted.

fa facti unā cōmiscantur: ad quas adhiçiatur minuta magnetis particula: certe singularis illa uis nostris etiā tēporib. æque ac priscis ita in se liquore uitri trahere creditur, ut ad se ferrū allicit: tractū aut purgat, & ex uindī uel luteo candidū facit: sed magnetē postea ignis cōsumit: qui uerō iā dictis succis carēt, ipsi duas portioēs cineris quernci uel ilignei, uel roborei, uel cerrei, aut, si hi in prōptu non fuerint, fagini uel abiegni cū una sabuli uel arenæ permī scēt, & addūt modicū salē, ex aqua salſa uel marina factū, atq; exiguā magnetis particulā: sed isti minus candidū & translucidū uitrū cōficiūt: uerū cinis ex antiquis arborib. fit: quarū truncus, ubi assurrexit ad altitudinē sex pedū cauatur, & iniecto igni arbor tota cōburitur, ac in cinerem uertitur: quod fit hyeme cū niues diutīnæ sedent, uel æstate, cū non pluit: nā imbres alijs anni tēporib. qđ cineres cū terra misceāt, impuros reddūt: quāobrē tūc ex ijsdem arborib. in plures partes sectis, & sub tecto cōbustis, cinis cōfiat. Sed uitra rijs alijs tres sunt fornaces, alijs duæ, alijs una: quib. tres, hi in prima coquūt materiā, in secūda eā recoquūt, in tertia refrigerant uitrea uasā & cætera opera cādētia: eorū prima fornax cōcamerata & furno similis sit: in cuius superiori camera, longa pedes sex, lata quatuor, alta duos lignis aridis accēs res mistæ coquātur acri igni donec liqueſcant, & in massam uertātur uitreā: etſi nondum satis à recremento purgatam: ea refrigerata extrahatur & in partē diuidatur: in eadem fornace ollæ, quæ continebunt uitrum, caleſiant.

Primæ fornacis inferior camera A. Superior B. Vitrea massā C.



44. AGRICOLA. (Reduced.)

CATALOGUE OF WHEELER GIFT

64. **Porta, Johannes Baptista della.** (1538-1615.) *Magiae naturalis sive de miraculis rerum naturalium libri xx.* 9 l.+303 pp. ill. portr. Folio. Neapoli, apud Horatium Saluianum.

Naples, 1589

Book vii. of this folio edition treats of magnetic phenomena. The magnetic field is clearly defined in cap. 22; the screening action of iron is recognized, cap. 30; the fact that sailors preferred steel for their compass-needles is stated, cap. 36, the reason assigned being that such magnets keep their "vim per centum annos." The weakening effect of heat is described, cap. 51. The preface to Book vii. contains on page 128 a clear statement of a sympathetic telegraph. See *Strada* (No. 90); the *Spectator* (No. 241); the *Guardian* (No. 119); *Gherardi* (No. 1799).

- 64a.—Another edition. 18 l.+669 pp. ill. 12mo. Francofurti, Samuel Hempelius.

Frankfort, 1607

Book vii. of this edition treats of the lodestone and compass; p. 289 contains the author's idea of a sympathetic telegraph, which he is said to have derived from Cardinal Bembo.

- 64b.—(English translation.) *Natural magic in twenty books wherein are set forth all the riches and delights of the natural sciences.* 3 l.+409 pp.+3 l. ill. Folio. London, Thomas Young.

London, 1658

This is the first English edition of Porta's celebrated work, being a translation from the Latin edition of 1589. Book vii. treats of the lodestone and magnetic phenomena. The famous allusion to a magnetic telegraph, p. 190; lodestone ground to powder, p. 199; magnetic attraction measured by balance method, p. 200; magnetic screening, p. 204; the declination and its variations, p. 208; place of no variation, p. 208; effect of heat on magnets, p. 212; magnetic field, p. 203; magnetic induction, p. 203; polarity produced by rubbing with lodestone, p. 206; uses of the sailing compass, p. 208. Porta owed much to Peregrinus, A. D., 1269; Gilbert, 1600, was indebted to both.

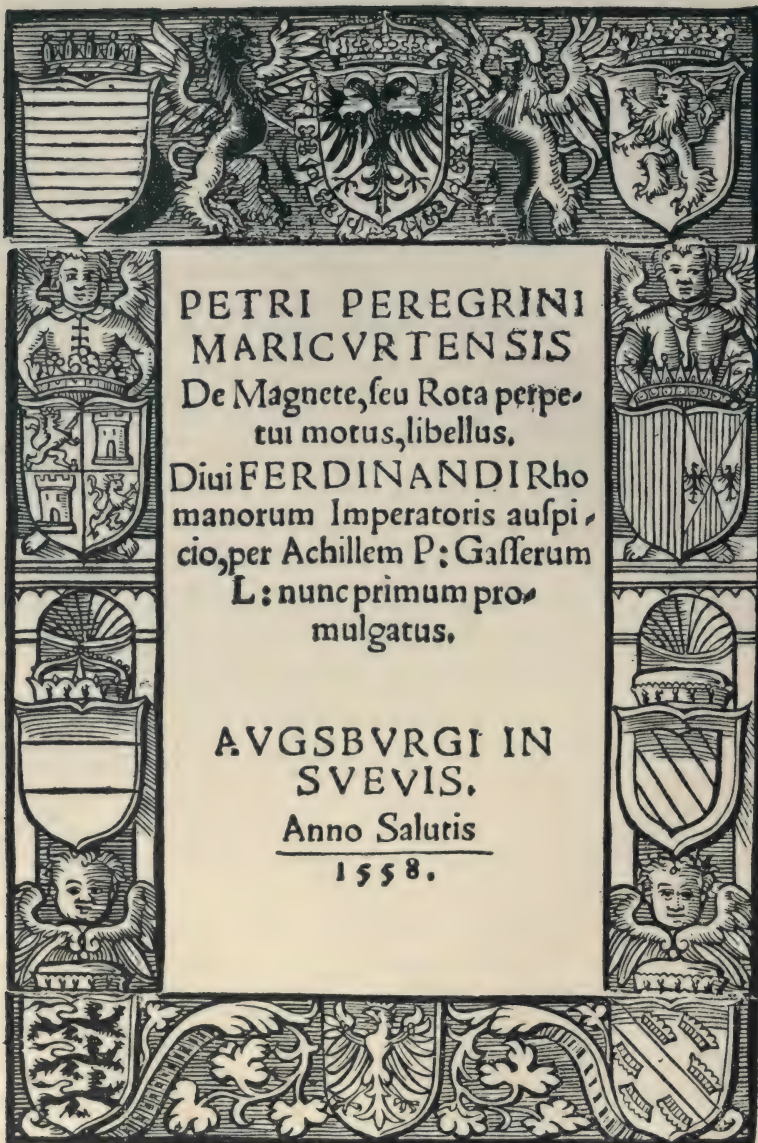
—See also 47.

65. **Borough, William.** (1536-1599.) *A discourse of the variation of the compasse, or magneticall needle. Wherein is mathematically shewed, the manner of the observation effects, and application thereof, made by W. B. (William Borough), and is to be annexed to the New Attractive of R. N. (i.e., Robert Norman).* 30 l. ill. 4to. London, by E. Alde, for Heugh Astley.

London, 1592

This very rare tract (preface dated 1581) derives its special importance from its being the first work in which was shown how the "Variation of the Compass" could be determined by accurate observation. The author's method is described in the third chapter, the value of the "Variation" there given, for London (1580) being $11^{\circ} 15'$ east. This interesting tract was printed together with Norman's *Newe Attractive* in 1581, 1585, 1592 and 1614.

66. **Norman, Robert.** (Flourished 1590.) *The Newe Attractive, containing a short discourse of the magnes or loadstone: and amongst other his vertues, of a new discovered secret and subtill propertie, concerning the declining of the needle, touched therewith under the plaine of the horizon. Hereunto are annexed certaine necessary rules for the arte of naviga-*



PETRI PEREGRINI
MARICVRTENSIS

De Magnete, seu Rota perpe-
tui motus, libellus.

Diui FERDINANDI Rho-
manorum Imperatoris auspi-
cio, per Achillem P: Gasserum
L: nunc primum pro-
mulgatus.

AVGSBVRGI IN
SVEVIS.

Anno Salutis

1558.

in quo sit a. atole. d. uen.
 in diol. 7 ism. s. 2. p. aydi
 uide. ut fiant. 2. lapid. ay
 eo. postea lapidem q. a. te
 net. aque exponas. ut
 fluctet. vides q. a. v
 ter. a. atone. ut p. 2. fine
 tur. a. n. uo tollit p. ay
 p. in lapidis si sit vni
 genens. 7 sic or. q. p. h.
 lapid. in ipso fractura q.
 fit. b. in diol. exiat. h.
 g. lapis de quo uide dic
 tum est. fingatur. ab.
 de reliquo 7 q. d. tenet
 si aque exponat. vides
 q. d. erit in diol. ut p.
 q. uide ad in diol. si aq.
 exponat. p. v. o. reliq. ex
 pte fractur. al. erit q.
 sic. c. Erat g. uide lapis
 . c. d. p. in lapid. al. b.
 sic agens. c. d. p. uens.
 Siq. vides q. due ptes
 duor. lapid. q. an. sepa
 ratione in vno lapide e
 runt q. tunc. post sepa
 ratione vna iucit. atiol.
 al. in diol. q. si in ipso
 hec dem ptes app. iucit.
 vna al. in atiol. quod
 usq. sibi iungatur. i. p. o.
 . b. c. v. fractura fuit. vñ
 quai est de naturali ap
 petu fuit vñ corpus

ut p. c. signu est si ite
 ce in uenit. eandem
 op. in qm pmo ex
 bit. Agens g. ut in ay
 exp. into. uide uide su
 um p. uens g. v. m. re.
 h. a. sic rone siliudine
 in ea. o. 2. g. ai. b. u. g. at.
 . c. uide atome fiat v
 na linea ex agente et
 p. uente s. hunc ordie.
 . ab. ed. ut. bc. sicut p. m.
 vñ. In hac. u. m. du
 reant. ten. saluatur. p.
 temp. at. p. u. exte
 mo. i. siliudine qua
 erant pmo. a. n. achle
 c. in total linea sic erat
 in diuisa. eodem modo
 de in diol. sic erit in ipso
 p. uente diuiso. sic est
 . n. in ipso v. m. to. bc. uo
 efflat id. 7 eod. modo
 accidit si. a. u. iungatur
 ai. d. ut due linee fiant
 vna uide v. m. o. in ipso
 atome s. hunc ordie.
 cd. ab. ut da. sicut vñ
 p. m. am. re. manebit
 p. p. p. m. s. p. u. ex. m. ay
 sic pmo. at. q. v. m. re. v.
 . c. na. q. p. s. at. iol. b. uo
 in diol. sic p. b. o. c. r. o.
 diuis. si a. f. i. e. n. t. al. e.
 no. siliu. re. h. y. p. p. m. s.

CATALOGUE OF WHEELER GIFT

tion: by the same R. N. newly corrected and amended by M. W. B(orough). 48 l. ill. 4to. London, by E. Allde, for Hew Astley. London, 1592

The fourth chapter of this remarkable and very rare work, the first in English on the magnet, contains the earliest printed record of the magnetic dip. The illustration shows its value, $71^{\circ} 50'$, in London for 1576, year in which the discovery was made by Norman himself. It is said that Hartmann of Nuremberg had noticed in 1544 the tendency of a magnet, freely movable in a vertical plane, to depart from the horizontal, but his letter remained unpublished for nearly three hundred years. (See Hellmann's *Rara Magnetica*, 1898.) The *Neuwe Attractive* contains a recognition of the sphere of influence, Gilbert's *orbis virtutis*, or field of force, surrounding a magnet. It also contains the first metrical composition on the magnet written in English. Norman was an instrument maker who lived at Limehouse, London. This is the third edition; the first edition appeared in 1581, and the second edition in 1585. (See No. 20, 256a, 823.)

- 66a.—Another edition. 4 l.+43 pp. 12mo. London. 1720
There are three copies of this reprint in the Wheeler Gift.

67. Porta, Johannes Baptista della. (1538-1615.) *De occultis literarum notis seu artis animi sensa occulte aliis significandi, aut ab aliis significata expiscandi enodandique*. Libri iiii. 8 l.+275+24 pp. ill. Montisbeliard, apud Jacobum Foillet.

Montbeliard, 1593

Extensive work on cryptography, or the use of secret characters, a subject which attracted considerable attention at the time.

—See also 47.

68. Bodin, Joannes. (16th Century.) *Universae naturae theatrum, in quo rerum omnium effectrices causae et fines quinque libris discutiuntur*. 4 l.+633 pp. 8vo. Lugduni, apud Jacobum Roussin. Lyons, 1596

Extensive work on natural philosophy; p. 243 contains a brief answer to the question "Why does a magnet draw iron to itself?" On p. 255, the words *electrum*, *succinum*, *electron* occur in answer to the question "What is amber?"

69. Barlow (or Barlowe), William. (? -1625.) *The Navigator's Supply*, containing many things of principal importance belonging to navigation, with the description and use of diverse instruments framed chiefly for that purpose, but serving also sundry other of cosmography in general. 50 l. ill. 7 plates. Sm. 4to. London, G. Bishop. London, 1597

Barlowe, Archdeacon of Salisbury, was a distinguished mathematician and was among the earliest English writers on the properties of the magnet. This celebrated tract of his opens with a detailed description of the sailing compass, including the two rings for its suspension. A compass for determining the "variation" is also minutely described. Very rare, being the only edition.

—See also 89.

- 70.* Maiolus (or Majolus), Simon. (1520-1597.) *Dies caniculares, seu colloquia tria & viginti, quibus pleraque naturae admiranda, quae aut in aethere sunt, aut in Europa, Asia,*

CATALOGUE OF WHEELER GIFT

atque Africa, quin etiam in ipso orbe novo, & apud omnes Antipodas sunt recensentur. 8 l.+1177 pp.+1 l. 4to. Romae, ex officina J. A. Ruffinelli. Rome, 1597

Properties of the lodestone, p. 780; *Ethiopian magnet* said to repel iron, p. 781; magnetic clock of Gerbert (Pope Sylvester II.), p. 783. The author was an Italian prelate.

- 70a.—Another edition. 4 l.+1248 pp.+30 l. Folio. Moguntiae, Joannis Godofr. Schonwetteri. Mayence, 1625

- 70bis. **Stevin, Simon.** (1548-1620.) The haven-finding art; or, the way to find any haven or place appoynted at sea by the latitude and variation. Translated into English (by E. Wright). 20 pp. ill. 4to. (no title-page.) (London, 1597)

Translation of the *Portuum investigandorum ratio* of Stevin or Stevinus, the Flemish mathematician and engineer. Places of no variation, p. 6.

—See also 107.

71. **W(right), E(dward)** (1560?-1615.) Certaine errors in navigation, arising either of the ordinarie erroneous making or using of the sea chart, compasse, crosse staffe, and tables of declination of the sunne, and fixed starres detected and corrected by E. W. 126 l. ill. pl. Sm. 4to. London, Valentine Sims.

London, 1599

Chap. 6 of this treatise describes the errors caused in sailing by neglecting the "variation," and shows how they may be avoided. Wright was a practical navigator as may be seen from the "Table of observations of the variation of the compass" taken on sea and land in his voyage to Fayal in 1589. He was lecturer on navigation to the East India Company. His laudatory address prefaced to Gilbert's *De Magnete* is well known. (See No. 72.)

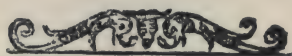
- 71a.—Certaine errors in navigation, detected and corrected by Edward Wright with many additions that were not in the former edition as appeareth in the next pages. 26 l.+427 pp.+122 pp.+12 l. Ill., two maps. Sm. 4to. London, Felix Kingston.

London, 1610

Engraved title page, $4\frac{1}{4} \times 6\frac{1}{4}$ ins., in duplicate, the lower part containing map of the world, $4\frac{3}{4} \times 2\frac{3}{4}$ ins. Map of the world on Mercator's projection in two parts, each 15×20 ins., signed "William Kip, sculpsit"; a note gives the name of some of the observers whose data on the variation of the compass are used in the map (Davis, Kendall, Hall, Lynschot, Candish and John De Castro). The second map, $19\frac{1}{2} \times 14\frac{1}{2}$ ins., has the legend "A particular sea chart for the Islands Azores." The engraved title page is not in the 1599 edition, nor the two large maps. The pagination passes from p. 52 to p. 55 and from p. 182 to p. 185, without interruption of the text. Pp. 441-456 are missing, interrupting the text, apparently due to an error in the numbering of the signatures which misled the binder; the missing portion in part includes the first pages of "An Answer to Simon Stevin" (See pp. 214-224, edition of 1657). The final 122 pages, called "The division of the whole art of navigation" are separately paged, and not contained in the edition of 1599. (See No. 70bis.)

C. H. Coote in discussing the extremely rare map of the world sometimes found in Hakluyt's "Hydrographical Description" says: "The conclusion is therefore irresistible, that whatever may be due to Molineux or

MAGIAE NATVRALIS;
SIVE
DE MIRACVLIS
RERVM NATVRALIVM
LIBRI IIII.



IO. BAPTISTA
PORTA NEAPOLITANO
AUCTORE.



Ad usum Praecepti Caesaris Ludovici Taberne, Regis. d. Augusti.

NEAPOLI
APVD MATTHIAM CANCER.

M. D. LVIII.
CVM GRATIA ET PRIVILEGIO
PER DECENNIVM.

47. PORTA. (Reduced.)



47b. PORTA—Portrait of Author. (Reduced.)

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Hakluyt in the execution of the original [Hakluyt map] it also represents the first map upon the true projection by Edward Wright . . . The truth is, that to Wright and not to Mercator is due the honor of being the first to demonstrate the true principles upon which such maps were to be laid down by means of the now well-known Table of meridional parts."

- 71b.—Certain errors in navigation. Detected and corrected by Edward Wright. With many additions that were not in the former edition. 14 l.+224 pp.+110 pp.+1 l.+20 pp. Ill., one map, 4to. London, Joseph Moxon. London, 1657

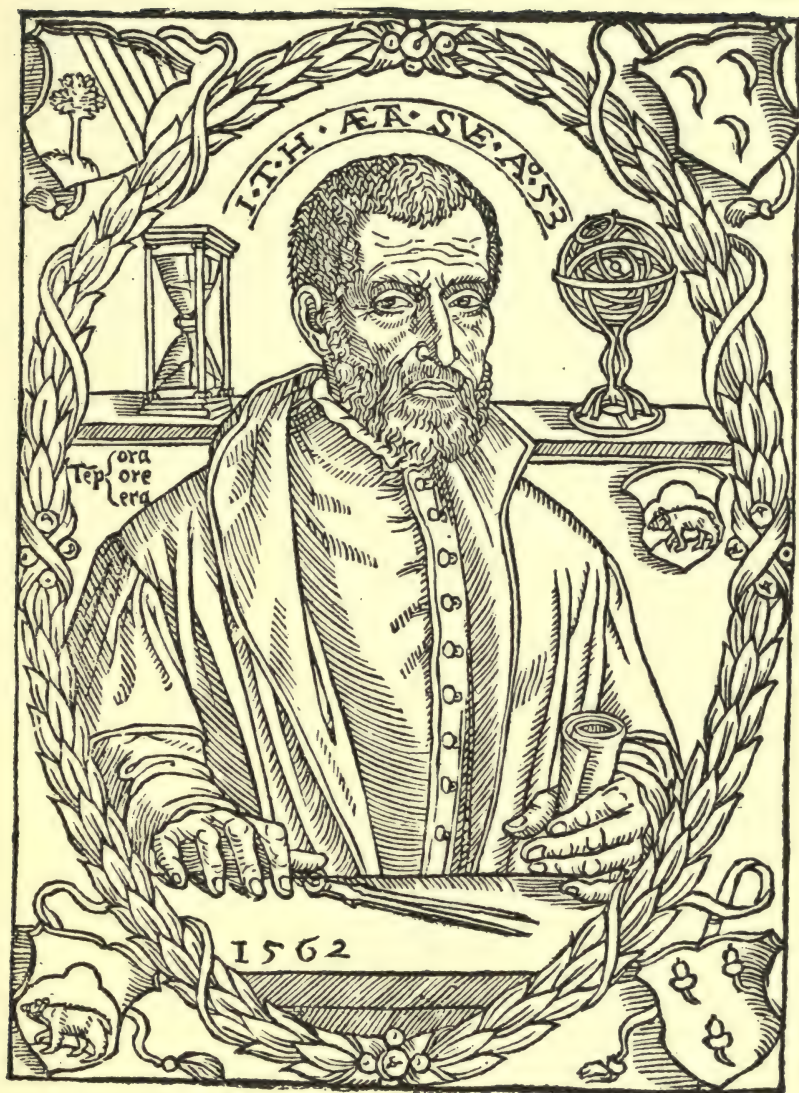
Engraved title-page, $4\frac{1}{2} \times 7$ ins., differing in some details from that of the 1610 edition. Contains a dedication and an address to the reader, signed by the publisher, Joseph Moxon. Inserted is a letter by Prof. S. P. Thompson addressed to Mr. Latimer Clark, pointing out that the section on "The Haven-finding Art." (20 pp.) is a translation from Stevinus (See No. 70 bis). The Map ($15\frac{1}{4} \times 10\frac{1}{2}$ ins.) is entitled "A Particular Platt, for sailing to the Isles of Azores."

—See also 87.

72. Gilbert, William. (1544–1603.) De magnete, magneticisque corporibus, et de magno magnete tellure, physiologia nova, plurimis et argumentis et experimentis demonstrata. 8 l.+240 pp. ill. Sm. folio. Londini, excudebat Petrus Short.

London, 1600

First edition of a remarkable work in the history of scientific discovery. It cost the author eighteen years of investigation and experiment. Large marginal asterisks mark what he considered great discoveries, and small asterisks minor ones. There are 21 of the former and 178 of the latter. Gilbert shows that a freely suspended magnet is controlled by the earth and not, as supposed, by extra-terrestrial influence. His magnetic theory enabled him to explain the behavior of the compass-needle, the dip-needle, the magnetic condition of vertical masses of iron, and the magnetic properties of heated iron bars when allowed to cool while lying in the magnetic meridian. Book ii., contains his *electrical work* and shows a great advance on previous writers. Gilbert is chary of praise and wrathful in denunciation; he was a staunch Copernican, and warm friend of Kepler and Galileo. Inserted in the volume is a portrait of Gilbert engraved by Champ from an original portrait in the Bodleian library, Oxford, now lost. The engraving was extracted from S. & E. Harding's *Biographical Mirror*, 1796, vol. ii., p. 33. Among publications relating to Gilbert, in addition to those entered below are the following which are not in the library. *Peter Short, printer, and his works*, 30 pp., ill. (A paper read by Prof. S. P. Thompson before the Bibliographical Society, May 17, 1897 and reprinted, 1898.) This paper traces the origin of the prominent printer's mark on the title-page of *De Magnete*, 1600. *Souvenir of William Gilbert's tercentenary year*, 16 pp., ill. (Presented by the Mayor of Colchester on the occasion of the Colchester Oyster Feast, October 20, 1904.) The souvenir contains a reproduction of Gilbert's engraved portrait, and of the title-pages of the 1600 *De Magnete* and of the *Philosophia Nova* (See 131); also a photographic facsimile of a deed signed by Gilbert (W. Gylberd), a photographic view of his birth-place and monument, and a half-tone reproduction of the tercentenary picture in the Colchester town-hall, a copy of which was presented by the British Institution of Electrical Engineers to the American Institute of Electrical Engineers. Dr. Benjamin Ward Richardson is the author of an article of 15 pages printed in the *Asclepiad*,



53. TAISNIER—Portrait of Author. (Reduced.)

To the Reader.

For the more careful and orderlie handling of such matters
as are necessarie incident to this presente treatise : All
which I haue bene content to doe, that the worke (though
it bee not big, yet effectuell) by the common vse thereof,
may yeeld profit accordingly, to them specially that are of
capacitie to comprehend this new reuealed secret. To con-
clude, the chieftest and onely marke whereat I lay leuell,
was the benefitting of my Countrie-men, in whom I wish
continuall increase of knowledge and cunninge, as in all
other commendable professions, so chieslie in those that
are most necessarie and profitable. Thus bequeathing
my trauaile heerein to thy discrete construction
and wishing thy furtherance in this most
necessarie and profitable knowledge,
I leaue thee to the direction
of Gods holy Spirit.
Fare-well.

Robart' Norman.



66. NORMAN.

CATALOGUE OF WHEELER GIFT

1884, having for title "The First Electrician, William Gilbert, M. D." With the acknowledged assistance of Mr. Menzies, Dr. Richardson gives in full for the first time in English dress Gilbert's address (his preface) to "the candid reader and student of magnetic philosophy." The *U. S. Magnetic Declination Tables*, 1902, contains an article of about 4500 words by Dr. L. A. Bauer on *De Magnete*. (See also note, 2447bis, *Hellmann*.)

- 72a.—*Tractatus, sive physiologia nova, De magnete, magneticisque corporibus et magno magnete tellure, sex libris comprehensus. Omnia emendatius edita, aucta et figuris illustrata, opera et studio W. Lochmans, with plates and engravings. 10 l.+232 pp.+17 l. ill. Sm. 4to. Sedini, typis Gotzianis.*

Stettin, 1633

Wolfgang Lochmann of Stettin brought out an edition of *De Magnete* in 1628 (very rare) which was the first one published abroad. This was followed by the present edition in 1633, which contains a preface by Lochmann; also the famous idyll of Claudin (4th Century) on the magnet. (See No. 55.) Mr. Conrad Cooks has recently found a copy of the 1628 Stettin edition with a new title page bearing the imprint, Frankfort, a/m, 1629. Signature of *Fr. Arogo* on title page.

- 72b.†—*Gilbert's Fables. By Thomas Commerford Martin. (Extract, North American Review, Vol. 146, No. 4, April, 1888, pp. 405-415.) 8vo.*

New York, 1888

A popular account of Gilbert and his work; growth of telegraphy and electric illumination; comparison of illuminants. "His airy 'fables' (as Chancellor Bacon called them) have resolved themselves into some of the most solid benefits that science has conferred on mankind."

- 72c.†—(Circulars relating to Gilbert Club and the translation of *De Magnete*.)

London, 1889-1901

1. Objects of the proposed Gilbert Club, 1889. 2. Statement of action at inaugural meeting, and announcement of details of the translation and its publication, 1890. 3. Rough specimen sheet, title-page and page of text, 1901. 4. Names of those who took part in translation and editing, and of printers and binders.

- 72d.†—*William Gilbert, of Colchester. By Conrad William Cooke. (Extract, Engineering, Vol. 48, pp. 717-718+729-730.) 12 pp. 8vo.*

London, 1890

Biographical notice; letter to Archdeacon Barlowe; testimony of Dr. Fuller: "Dr. Gilbert's book on magnetism published in 1600, is one of the finest examples of inductive philosophy that has ever been presented to the world. (Thomson *History of the Royal Society*, London, 1812.)

- 72e.—*Gilbert of Colchester, an Elizabethan magnetizer. (By Prof. Silvanus P. Thompson, F.R.S.) 63 pp. Sm. 4to.*

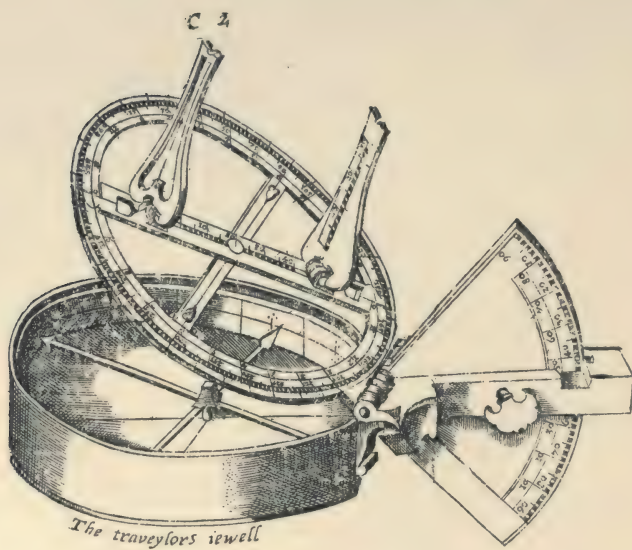
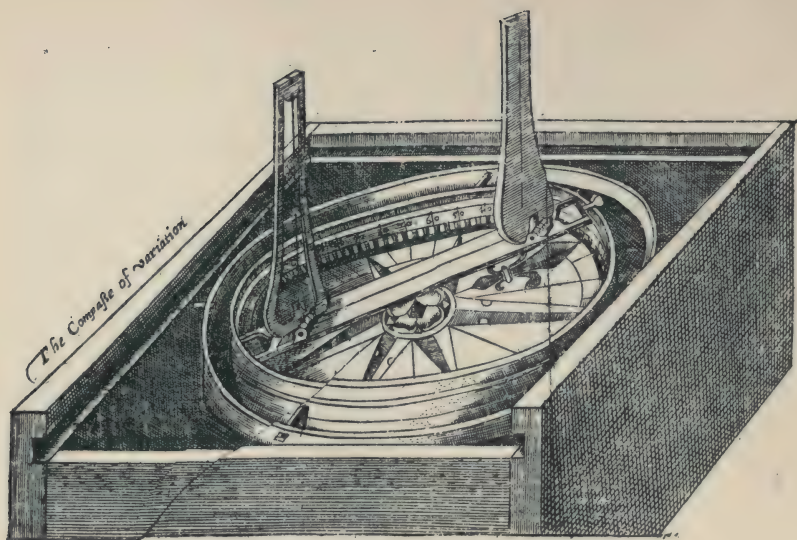
London, 1891

Account of Gilbert's life and scientific discoveries, followed by a list of his works. The last fifteen pages are devoted to the bibliography of "The Sette of Odd Volumes," of which the above is one.

- 72f.—*Facsimile reprint of London folio of 1600. 8 l.+240 pp. Small folio. Berlin, Mayer & Mueller.*

Berlin, 1892

A photo-zincograph reproduction.



69. BARLOW. Mariner's Compass.

CATALOGUE OF WHEELER GIFT

- 72g.†—William Gilbert of Colchester, Physician of London, on the loadstone and magnetic bodies, and on the great magnet, the earth. A new physiology demonstrated with many arguments and experiments. A translation by P. Fleury Mottelay. 54 +368 pp. 8vo. New York, 1893

Reduced reproduction of title-pages of 1600, 1628 and 1633 editions. Frontispiece portrait. Gilbert's arms. Biographical memoir, with Address of Edward Wright. Reduced reproduction of title-page of Gilbert's *De Mundo Nostro* of 1651. (See No. 131.) This is the *first* complete translation of Gilbert's *De Magnete* into a modern language. The foot-notes are numerous and of considerable historical and bibliographical value. Mr. Paul F. Mottelay is the author of a valuable *Bibliographical History of Electricity and Magnetism* which will soon appear in book form.

- 72h.†—William Gilbert of Colchester, physician of London. On the Magnet, and on the great magnet, the earth; a new physiology demonstrated by many arguments and experiments. (Translation by the Gilbert Club.) 246 pp., ill. Large 8vo. Imprinted at the Chiswick Press, anno MCM.

London, 1900

The Gilbert Club was formed under the presidency of Sir William Thomson (Lord Kelvin) for the purpose of preparing a translation of Gilbert's *De Magnete*. Following are the names of those who took part in the translation or revision: Rev. A. W. Howard, Mr. G. T. Dickin, Mr. Edward Little, Prof. R. A. Sampson, Prof. Meldola, Mr. Latimer Clark, Sir B. W. Richardson, Rev. W. C. Howell, Prof. Silvanus P. Thompson, Dr. Joseph Larmor. This version is, as far as circumstances permitted, a facsimile in English of the original Latin folio edition of 1600. The translation corresponds page for page; the cuts and the ornamental initial letters have been either recut or reproduced in facsimile. A short index has been added to facilitate consultation. The edition was limited to 250 copies.

- 72i.†—Notes on Gilbert's *De Magnete*: (By Prof. Silvanus P. Thompson, F.R.S.) Privately printed. London, MCM. 68 pp. Large 8vo. London, 1901

Valuable literary, historical, geographical and bibliographical notes, including many references to works of authors quoted by Gilbert and to other writings of related interest, with a detailed bibliography of *De Magnete*. On p. 52 is a reproduction of the original engraving followed by the artist who prepared the cut in *De Magnete*, representing a blacksmith at his forge, and which was re-engraved, with changes, for the 1628 and 1633 editions. The Notes are bound with copies of the translation of *De Magnete* issued to members of the Gilbert Club.

- 72j.†—Gilbert of Colchester. The tercentenary of electric and magnetic science. 14 pp., frontispiece portrait, ill. By Brother Potamian, D.Sc. (Reprint, Popular Science Monthly, September 1901.) 8vo. New York, 1901

Biographical sketch with criticism of Bacon's belittling remarks; parallel between Gilbert and Bacon; analysis of Gilbert's work in electricity, magnetism and terrestrial magnetism. "If any one deserves to be called the founder of the experimental school of philosophy, we contend that it is not Bacon the thinker and essayist, but Gilbert the methodical worker and fruitful discoverer."

P H. Est compertissima omnibus hæc Asbesti vis, ut semel accensus ex eo ignis numquam restinguatur: nam Diuus Augustinus rerum omnium peritia illustris de eo quoque pluribus agit de Ciuit Dei lib. 2. cap. 5. & cap. 6. Recolit enim Veneris templo adhibitum cum lucerna candelabrum, quæ sub dio cum noctu, dicque arderet, nulla tamen tempestate, nullis imbribus extinguere potuerat. Vnde necessarium fuit coniungere, sicut lapis, ita lucerna quoque, ac lychnus ex Asbesto constarent. Propterea de illo ipso Fano Veneris, ac lucerna inextinguibili (inquit) ita sentimus, ut in ea mechanicum aliquid de Asbesto ars humana molita sit: aut arte magica factum sit, quod homines illi mirentur in templo; aut demon quispiam sub nomine Veneris tanta se efficacia præsentauit, ut hoc ibi prodigium & appareret hominibus, & diutius permaneret. Hæc ille ex veterum annalibus. Cum igitur ea tanta Asbesti vis etiam Diuo Augustino pro comperta habeatur, non est, quod de ea ambigamus, sed rei rationem est impossibile assequi humano ingenio: diuinum id miraculum in lapide hoc inditum censendum est. Sed de lapidum naturis cum igne sat, superque diximus: nunc ad alios lapides conuertenda nostra oratio est; primumque de Magnete.

E Q. Magnes præ cæteris omnibus naturæ arcana multa, continet, neque ad integrum vis eius humano generi comperta est, ut censeo: propterea de ipso solo librum scripsit doctissimus Ioannes Baptista à Porta Neapolitanus, longe plures, quam rentenos eius effectus enumerans incredibili solertia, & obseruatione.

T H. Dubio procul nemo mente assequi eius naturam, vimque, ac rationem umquam potuit ad integrum: præsertim qua ratione ferrum sua natura grandissimum ad se leuissime trahat: propterea, virtute caelesti id illi esse inditum, nulla autem elementalī vi tradit sancti viri, & in ijs præcipuus Diuus Thomas Aquinas quodlib. 12. art. 15. Quamobrem ne frustra disquirendæ eius rei causæ incumbamus, quam assequi non valeamus, differendum puto de rebus memorabilibus, quæ ob eam Magnetis vim acciderunt.

P H. Exordiri libet ab eius lapidis origine, vbi inuentus primus: tradunt in Ida monte repertum primum ab homine, vnde nomen accepit, Magnete nuncupato, ut Nicander testatur, ac Plinius lib. 36. cap. 16. Inuenisse enim eum narrat ob clauos ferreos crepidarum, & baculi cuspidem ferream, cum solo nimis velut tracta hærent, cum armenta pasceret. Id quoque scribit Isidorus lib. 16. cap. 4. qui & illud adiicit, ferrugineum colorem illi esse, atq; ideo ferrum apprehendere, velut cognatione naturæ complectendum: attra-

CATALOGUE OF WHEELER GIFT

- 72k.†—William Gilbert of Colchester. A sketch of his magnetic philosophy. By Charles E. Benham. 103 pp., 2 plates. Sm. 4to. *Colchester, 1902*

A popular sketch of Gilbert and his philosophy: "The man, wherein his genius lay, his faults and failings, the essential qualities of his work without a laborious following out of his innumerable experiments and arguments." A full-page representation is given of Gilbert's tomb in Holy Trinity Church, Colchester.

- 72l.†—Gilbert, Physician: A note prepared for the three-hundredth anniversary of the death of William Gilbert of Colchester, president of the Royal College of Physicians, & physician to Queen Elizabeth, by Silvanus P(hillips) Thompson, F.R.S. 32 pp Sm. 4to. Chiswick press. *London, 1903*

A biographical sketch, with especial reference to Gilbert's career as physician.

- 72m.†—William Gilbert, and terrestrial magnetism in the time of Queen Elizabeth: A discourse by Silvanus P(hillips) Thompson, F.R.S. 16 pp. Sm. 4to. Chiswick press.

London, 1903

A paper read before the Royal Geographical Society, March 23, 1903. Includes an interesting account, with bibliographical references, of the knowledge of the compass to the time of Gilbert.

- 72n.†—The family and arms of Gilbert of Colchester. By Silvanus P(hillips) Thompson (Reprint, Transactions Essex Archeological Society, vol. ix, 1904.) 15 pp., 1 plate, genealogical chart, ill. 4to. *London, 1904*

A paper read before the Essex Archeological Society at its Jubilee. The genealogy commences with Thomas Gilbert, a Burgess of Colchester, born 1428. An appendix gives a list of the considerable property possessed by Gilbert at his death.

—See also 131.

73. Sunde, Janus Hercules de. (pseud. of Daniel Schwenter.) (1585-1636.) *Steganologia & Steganographia aucta, Geheime, Magische, Natuerliche Red- und Schreibkunst.* 12 l.+370 pp.+6 l. ill. 16mo. Nuernberg, Simon Halbmayers. *Nuremberg, (1600)*

This rare book gives a lengthy and interesting description of magnetic signaling, p. 127; the operator calls up his friend by ringing a bell by means of a bar-magnet; the needles are also moved by bar-magnets and the letters formed by one or more strokes to the right and the left as in the modern needle telegraph. Signaling by means of mirrors, p. 136. The date given above is from the Catalogue of the British Museum. (See Nos. 90, 190, 193.)

—See also 110 bis.

74. Blundeville, (Thomas). (1530 (?) —.) *The theoriques of the seuen planets, shewing all their diuerse motions, and all other accidents, called Passions, thereunto belonging. Whereunto is added by the said Master Blundeville a breefe extract by him made of Maginus his Theoriques, for the better understanding of the Prutenicall tables, to calculate thereby the diuerse motions of the seuen planets. There is also hereto added, The making, description, and use of two most ingenious & necessarie instruments for sea-men to find*

Certaine
ERRORS IN
NAVIGATION,

Arising either of the or-
dinarie erroneous making
or vſing of the ſea Chart, Com-
paſſe, Croſſe ſtaffe, and Tables of
declination of the Sunne, and
fixed Starres detected and
corrected.

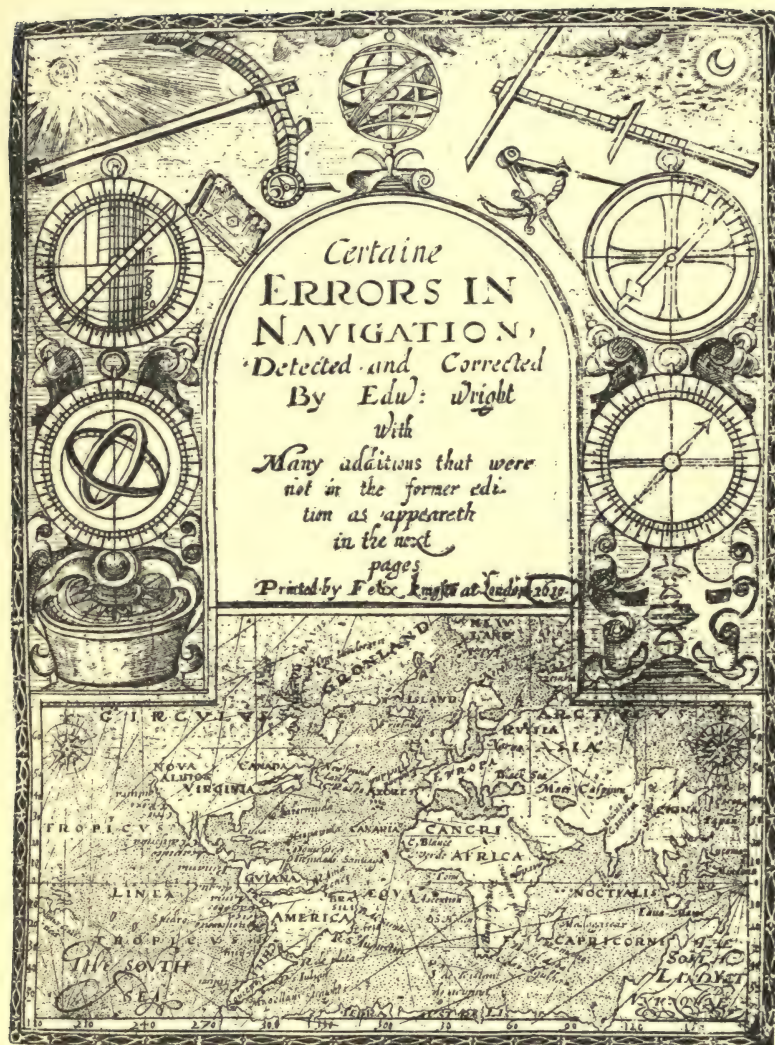
By E. W



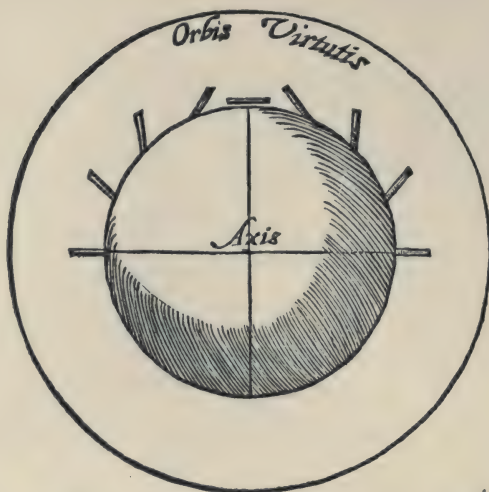
Printed at London by Valentine
3 Sims. 1599.

*Amiciſſimo ſuo Georgio Eſtey in perpetuam
amicitie memoriam Edw: Wright D.D.*

71. WRIGHT.



71a. WRIGHT. (Reduced.)



Quò propiores fuerint partes æquinoctiali, eò magis oblique alliciunt magnetica; at polis viciniore partes magis directe aduocant, in polis directissime. Eadem etiã ratio est conuersionis magnetũ omnium qui sunt rotundi & qui sunt longi, sed in longis experimentum est facilius. Nam in quãuis formã est verticitas, & sunt poli; sed propter malam formam & inæqualem, sæpius quibusdam malis impediuntur. Si lapis longus fuerit, vertex verò in finibus, non in lateribus; fortiùs in vertice allicit. Conferunt enim partes vires fortiores in polum rectis lineis, quàm obliquis. Sic lapis, & tellus naturã conformant motus magneticos.

C A P. VII.

De potentiã virtutis magneticæ, & naturã in orbem extensibili.



Vnditur virtus magnetica vndeque circa corpus magneticum in orbem; circa terrellam sphæricẽ; in alijs lapidum figuris, magis confusẽ & inæqualiter. Nec tamen in rerum natura subsistit orbis, aut virtus per aërem fusa permanens, aut essentialis; sed mag-
nes

CATALOGUE OF WHEELER GIFT

out thereby the latitude of any place upon the sea or land, in the darkest night that is, without the helpe of sunne, moone or starre. First invented by Doctor Gilbert and now set downe by Master Blundeville. 3 l.+292 pp. ill. pl. Sm. 4to. London, Adam Islip. *London, 1602*

The author recognizes his indebtedness to Gilbert, p. 279, for two magnetic instruments held to be useful for finding the position of a ship at sea. The method is based, however, on two errors into which Gilbert had fallen, viz: (a) that the magnetic equator and magnetic poles coincide with those of the earth; (b) that the isoclinic lines coincide with parallels of latitude. This quaint work was published during Gilbert's lifetime.

—See also 91.

75. **Nautonnier**, Guillaume de. (Sieur de Castelfranco.) *La mécométrie de l'eymant c'est-à-dire la manière de mesurer les longitudes par le moyen de l'eymant par laquelle est enseigné un très certain moyen, auparavant inconnu, de trouver les longitudes géographiques de tous lieux, aussy facilement que la latitude. Davantage y est démontré la déclinaison de la guideymant pour les lieux.—Mécographie de l'eymant, c'est-à-dire la description des longitudes trouvées par les observations des déclinaisons de l'eymant.* 16 l.+12 pp.+2 l.+327 pp.+6 l.+32 pp. ill. map. Folio (title-page missing.) Venes et Tolose, chez l'auteur et chez Raimond Colonies à Courteneufue.

Venes & Toulouse, 1603-1604

Elaborate treatment of the magnet as a means of determining longitude. The method was based on erroneous assumptions. The figures on pp. 239, 240, 246 are specially interesting. Engraved title page to each part; that of part 2 reads: *La mécographie de l'eymant.* . . .

76. **Morales** (otherwise Albero), Gaspar. (— — —.) *Libro de las virtudes y propiedades maravillosas de las piedras preciosas.* 8 l.+378 pp.+4 l. 12mo. Madrid, Luis Sanchez.

Madrid, 1605

Very rare work on precious stones; the chapter on the lodestone is a repetition of fabulous properties attributed to it; such as that it cures dropsy and is an antidote against poison.

77. **d'Acosta**, José. (1539-1600.) *Histoire naturelle et morale des Indes, tant Orientales qu'Occidentales. Où il est traité des choses remarquables du ciel, des élémens, métaux, plantes & animaux qui sont propres de ces pais. Ensemble des moeurs, cérémonies, loix, gouvernements & guerres des mesmes Indiens. Composée en castillan par Joseph Acosta, & traduite en françois par Robert Regnault Cauxois. Dernière édition, revue & cor. de nouveau.* 8 l.+352 pp.+18 l. 12mo. Paris, Marc Orry.

Paris, 1606

Power communicated to iron when rubbed with a lodestone, p. 34; polarity developed by such rubbing, p. 35; "variation," p. 35, where it is said that there are four places known in which there is no variation. Chap. xxix mentions properties of amber other than electrical. The author, a Spanish Jesuit, lived for some time in Peru.

Zum dritten.

Auff zwö oder drey Meil / et-
nem / den man weder sehen noch hören
kan / durch einen Compasten. etwas
zuversichen zugeben.

Seil dieses ein sonderlich Secret vnd
Geheimnus / hab ich es auch geheim
kithero gehalten / daß es nicht ein je-
der Bauer verstanden / vnd deßhalb in der er-
sten edition wort gebraucht / welche nur ge-
lehrte Chymici, Physici vnd Medici verstan-
den. Jetzt aber will ichs dem Kunstliebenden zu-
guten wie die Kunst für sich selbst ist / an Tage
geben. Es ist aber die ganze Kunst daran gele-
gen daß man ein Eisen in form eines spitzigen
Diamants also züricht / daß es ein Magnets-
zünglein auff zwö oder drey Meil bewegen
konne / im Strickel wohin man will / wollen also
den Compasten vñ das Eisen leyren züricht:n.

Erslich werden zween Compasten zu je-
richet in der vierung einer hand breit / kleiner
oder grösser / mit dem Zünglein / daß doch mit
dem Magnet nicht berühren wird / einer wie
der ander / darcin werden mit zweyen Creutz-
streichen

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78. **Harward, Simon.** (— — —) A discourse of the severall kinds and causes of lightning written by occasion of a fearefull lightning which in the 17 November, 1606, did burne up the spire steeple of Blechingley. 12l. Sm. 4to. London, John Windet.

London, 1607
This curious discourse contains an allusion to the efficiency of guns and bells in averting the dangers of lightning. "By the stirring of the aire, the cloudes may be the sooner dispersed and driven away."

79. **Scaliger, Julius Caesar.** (1484-1558.) *Exotericarum exercitationum liber xv. De Subtilitate ad Hieronymum Cardanum.* 8 l.+1129 pp.+46 l. 12mo. Francofurti, apud Claudium Marnium.

Frankfort, 1607

Italian scholar and critic (Della Scala): how a magnet may lose its strength, p. 374; the lodestone in general, p. 446; magnetic attractions and repulsions, p. 1074. Some of Scaliger's opinions and statements were criticized by Gilbert, which elicited from Joseph Justus Scaliger, the philologist, depreciatory remarks about "a certain Englishman who produced a book on the magnet three years ago which has not justified the expectations formed of it." (See No. 37.)

- 80.* **Solinus, Caius Julius.** (3d Century.) *Polyhistor, vel, rerum toto orbe memorabilium thesaurus. Hac postrema editione adiectus est Pomponii Melae liber de Situ Orbis.* 8 l.+203 pp.+2 l.+110 pp. 12mo. Lugduni, Claudius Larjot.

Lyons, 1609

This work on ethnography and natural history was written probably in the 3rd Century; it is a compilation from Pliny; references to "lychnites" and the lodestone, p. 188; biographical notice of the author.

—See also 16.

- 81.* **Alsted, Johann Heinrich.** (1588-1638.) *Compendium physicae in quinque partes.* 110 pp. 16mo. Herbornae Nassoviorum.

Herborn, 1610

Treats briefly of the world, plants, minerals, meteors, the elements; tides, p. 71; and the magnet, p. 90.

82. **Arlensis, (de Scudalupis) Pierre.** (Fl. 1580.) *Sympathia septem metallorum, ac septem selectorum lapidum ad planetas.* 2 l.+pp. 245-470+35 l. 12mo. Parisiis, David Gillius.

Paris, 1610

The author, Peter of Arles, states, p. 275, that he tried to work a pair of sympathetic compasses after the manner described by Porta but failed; p. 442, the lodestone is said not to be a metal because it is not metallic throughout; p. 452, the declination for Paris is given as 7° or 8° E; p. 454, Cardan is quoted as saying that the lodestone attracts silver; p. 441, Gilbert is spoken of as *doctissimus vir*; p. 453, loss of magnetic properties by heat. The first edition was published in Rome; it was republished in Madrid in 1602. This is the third and re-edited edition. The first edition appeared about 1540.

—See also 83.

83. **Leonardus, Camillus.** (16th Century.) *Speculum lapidum; cui accessit Sympathia septem metallorum ac septem selectorum lapidum ad planetas D. Petri Arlensis de Scudalupis.* 22 l.+499 pp.+52 l. portr. 12mo. Parisiis, Carolus Seuestre.

Paris, 1610

Celebrated treatise on gems, original edition, 1502. Reference to *succinum*

T H E

Theoriques of the seven Planets, shewing
all their diuerse motions, and all other Accidents, cal-
led Passions, theréunto belonging. Now more plainly set forth in
our mother tongue by M. *Blundeule*, than euer they haue been heretofore in any
other tongue whatsoeuer, and that with such pleasant demonstratiue figures, as eu-
ry man that hath any skill in Arithmeticke, may easily vnderstand the same.

A Booke most necessarie for all Gentlemen that are desirous to be skil-
full in Astronomie, and for all Pilots and Sea-men, or any others
that loue to serue the Prince on the Sea, or by the
Sea to trauell into forraine Countries.

Whereunto is added by the said Master
Blundeule, a breefe Extract by him made, of *Magi-*
nus his Theoriques, for the better vnderstanding of the
Ptolemaicall Tables, to calculate thereby the diuerse mo-
tions of the seven Planets.

There is also hereto added, The making, description,
and vse, of two most ingenious and necessarie Instruments for
Sea-men, to find out thereby the latitude of any Place upon the Sea
or Land, in this dayes night that is, without the helpe of Sunne, Moone, or Starre.
First invented by M. Doctor Gilbert, a most excellent Philosopher, and
one of the ordinarie Physicians to her Maestie: and now here
plainly set downe in our mother tongue by
Master Blundeule.



LONDON,
Printed by Adam Islip.

1602.

74. BLUNDEVILLE. (Reduced.)

CATALOGUE OF WHEELER GIFT

or yellow amber and *gagates* or black amber, p. 108. Varieties of lodestone, p. 128. First instance of *filar* suspension used for magnets, p. 129. (See No. 82.) The book is dedicated to Caesar Borgia.

- 83a.—(English translation.) The mirror of stones, in which the nature, generation, properties, virtues and various species of more than 200 different jewels, precious and rare stones are distinctly described. Now first translated into English. 240 pp. 12mo. London, for Freeman. London, 1750

Translation of famous book on gems: *lyncurius*, p. 116; *ligurius*, p. 118; the lodestone, p. 206; diamond and garlic myths, p. 207; magnet suspended by a fiber, *filar* suspension, p. 207. Book III (engraved stones) omitted.

—See also 5.

84. Bongars, Jacques. (1554-1612.) *Gesta Dei per Francos, sive Orientalium expeditionum et Regni Francorum Hierosolimitani historia a variis, sed illius aevi scriptoribus, litteris commendata; nunc primum aut editis, aut ad libros veteres emendatis. Auctores praefatio ad lectorem exhibet. Orientalis historiae tomus primus (et secundus).* (Vol. 2 by Marino Sanuto Torsello, has special title-page:) *Liber secretorum fidelium crucis super Terrae Sanctae recuperatione et conservatione quo et Terrae Sanctae historia ab origine & eiusdem vicinarumque provinciarum geographica descriptio continetur. Cuius auctor Marinus Sanctus dictus Torsellus patricius venetus. Nunc primum, cum libello eiusdem argumenti, sine auctoris nomine, ex mss. veteribus editus.* 2 vols. in 1. 1263+373 pp. Folio. Hanoviae, heredes Joan. Aubrii.

Hanau, 1611

The history of the Orient from p. 1051 to p. 1145 of this celebrated work is taken from Cardinal Jacques de Vitry, who died in Rome in 1244. In these pages, we find the earliest reference by a European writer to the use of the magnet for navigating purposes, p. 1106; *gagates* and *lyncurium* are mentioned on p. 1107. Cardinal de Vitry wrote his famous history of Jerusalem about the year 1218. The name of *Peregrinus* occurs on fol. (e).

85. Goclenius, Rodolphus (the younger). (1572-1621.) *Tractatus novus de magnetica vulnerum curatione, citra ullum et dolorem et remedii applicationem et superstitionem. Huic annexus est alter, de luxuriosis ac portentosis nostri seculi conviviis.* 4 l.+174 pp. 12mo. Francofurti, impensis Petri Musculi. Frankfort, 1613

Book on "Natural Magic," a favorite subject of the time: supposed magnetic cure of wounds, p. 88. (See Nos. 113, 119, 120, 152.)

—See also 119.

86. Ridley, Mark. (1560-1624.) *A short treatise of magneticall bodies and motions.* 7 l.+158 pp. ill. portr. Sm. 4to. London, Nicholas Okes. London, 1613

This tract is based on Gilbert's *De Magnete* (see No. 72), whose labors are spoken of in the preface as "the greatest and best in magneticall philosophy."

SECOND LIVRE DE LA MECOMETRIE DE LEYMANT.

Auquel est décrit l'usage, & pratique des preceptes contenus en la
Theorique precedente; & enseigné comment par le moyen
de la Guydeymant, il faut prendre les longitudes Geo-
graphiques de tout lieu proposé, soit par
Terre, ou par Mer.

*De l'invention de Guillaume de Nautonnier, Sieur de Castelfrançois
en Languedoc.*



Avec Privilege du Roy.

M. D. C. IIII.

75. NAUTONNIER. (Reduced.)

CATALOGUE OF WHEELER GIFT

Archdeacon Barlowe attacked Ridley in the first of electrical controversies, going so far as to claim that Ridley had stolen his manuscript and embodied its contents in this treatise. (See No. 89.)

87. Wright, Edward. (1560-1615.) The description and use of the Sphaere divided into three principal parts. 4 l.+104 pp. ill. Sm. 4to. London, for John Tap. *London, 1613*

This little work treats exclusively of astronomical problems. The author, a distinguished mathematician, constructed a sphere which represented the motions of the moon and planets.

—See also 71.

88. Foscarini, Paolo Antonio. (1580-1616.) *Epistola circa Pythagoricorum, & Copernici opinionem de mobilitate terrae et stabilitate solis, et de novo systemate seu constitutione mundi. In qua Sacrae scripturae auctoritates adversus hanc opinionem adductae conciliantur.* pp. 465-495+12 l. 4to. Napoli, Lazarus Scorigius. *Naples, 1615*

Astronomical systems of the world from the time of Pythagoras to that of Copernicus. The author, a Carmelite monk, defends the Copernican system.

89. Barlow (or Barlowe), William. (?-1625.) *Magneticall advertisements; or, Divers pertinent observations, and approved experiments concerning the nature and properties of the load-stone.* 8 l.+86 pp.+1 l. ill. Sm. 4to. London, E. Griffin. *London, 1616*

Compendium of what was known about the magnet and the mariner's compass in the author's time. In the preface he acknowledges his indebtedness to Gilbert. Appended to the tract is a letter from Gilbert to Barlowe which shows that he (Gilbert) intended to make important additions to his *De Magnete*. (See No. 72 and note to No. 86.) The term *magnetisme* is said to occur for the first time in this work; see the 2nd page of *The Epistle Dedicatoire*. Kircher has the term *electro-magnetismus* as title to a chapter in his *Magnes sive de Arte Magnetica*, 1641. (See No. 116.) Barlowe was Archdeacon of Salisbury.

- 89a.—New edition, with notes by William Sturgeon, xv+78 pp. ill. 1 pl. 12mo. London, Sherwood. *London, 1843*

Sturgeon is well known for his magnetic investigations, author of numerous researches in electromagnetism.

—See also 69.

90. Strada, Famianus. (1572-1649.) *Prolusiones academicae. Nunc demum ab auctore recognitae, atque suis Indicibus illustratae.* 6 l.+420 pp.+18 l. 12mo. Lugduni, apud Horatium Cardon. *Lyons, 1617*

This work of the Italian Jesuit is noted for a poem on an imaginary magnetic telegraph, beginning p. 306. This telegraph consisted of two needles stroked by the same lodestone and attached to two separate, alphabetical dials. A metrical translation of this poem will be found in Hakewill's *Apologie* (See No. 99). The poem is referred to in *Spectator*, No. 241 and *Guardian*, No. 119. A similar arrangement of sympathetic magnets had been described by Porta in his *Magiae Naturalis*, 1589, Book vii (see No. 64); (see also No. 64), Sunde, *Steganologia* (No. 73); Bertelli (No. 1711); Gherardi (No. 1799); Solly (No. 2875); Axon (No. 3857); Grimshaw (No. 3875); Jevons (No. 3878); Wheatley (No. 4156).



83. LEONARDUS.

CATALOGUE OF WHEELER GIFT

- 90a.—Another edition; *Prolusiones academicae*. Nunc secundo ab auctore recognitae, atque suis Indicibus illustratae. 61.+420 pp.+17 l. 12mo. Lugduni, sumptibus Jacobi Cardon et Petri Cavellat.

Lyons, 1627

—See also 99, 102, 111, 213, 344, 874.

91. **Blundeville, Thomas.** (1530 (?) —.) His exercises, contayning eight treatises, the titles whereof are set downe in the next printed page: which treatises are very necessary to be read and learned of all young Gentlemen that have not beene exercised in such Disciplines, and yet are desirous to have knowledge as well in *Cosmographie*, *Astronomie*, and *Geographie*, as also in the Art of Navigation, in which art it is impossible to profit without the helpe of these, or such like illustrations. The sixth edition corrected and augmented. 7 l.+799 pp. ill. map, tab. Sm. 4to. London, William Stansby.

London, 1622

Chap. xxiii. beginning p. 681 of this popularly-written work contains a description of the compass and its use in navigation. A method is given in Chap. xxvi. for determining the "Variation" at any place; the first edition appeared in 1594.

—See also 74.

92. **Zacarie** (or *Zachaire*, *Zachariae*, *Zacharias*), Denis. (1510-1556.) *Livre d'arithmétique et géometrie, avec l'art d'arpenter & mesurer toutes superficies de terre. Ensemble un traicté de la boussole.* 4 l.+55+64+30 pp.+1 l. ill. 12mo. Paris, Nicholas Rousset.

Paris, 1625

This little book on the application of geometry contains an interesting chapter on the topographical use of the compass.

93. (**Van Etten**, Henry) pseud. (i.e. Jean Leurechon.) (1591-1670.) *Recreation mathématique, composee de plusieurs problemes, plaisants et facetieux, en fait d'Arithmetique, Geometrie, Mecanique, Optiq.; et autres parties de ces belles sciences.* 7 l.+188 pp. 5 plates, 12mo. Paris, chez Rolet Boutonne.

Paris, 1626

The author's real name was Jean Leurechon, a French Jesuit. Problem 74, p. 94, treats of the lodestone and of needles rubbed by it. On p. 96, it is said that the "variation" beyond the Fortunate Isles is about 8°. The next paragraph refers to sympathetic magnets and the possibility of communicating with persons at a distance by means of a dial-plate and movable magnet pivoted at the center. The author does not believe that any such magnets can be found. Diagram of magnetic telegraph, p. 94. This book acquired considerable celebrity; first edition, 1624; English translation, 1633. (See Bertelli, No. 1711; Gherardi, 1799.)

- 93a.—*Les recreations mathematiques, avec l'examen de ses problemes en Arithmetique, Geometrie, Mecanique, Optique; et autres parties de ces belles sciences. Premièrement reueu par D(enis) Henrion, depuis par M. Mydorge et tout nouvelle-*



86. RIDLEY. (Reduced.)

CATALOGUE OF WHEELER GIFT

ment corrige et augmente. Cinquieme et derniere edition. 8 l.+416 pp. ill. 16mo. Paris, Cardin Besongne.

Paris, 1659

Fifth edition of the celebrated work of the French Jesuit; disproves magnetic communication between distant persons, p. 161; armed lodestones, p. 161; demagnetization, p. 165; how to find the poles of a magnet, p. 166.

- 93b.— (English translation.) Mathematicall recreations; or, a collection of sundrie problemes and experiments in arithmeticke, cosmographie, astronomie, architecture, chimistrie, etc., extracted out of the ancient and moderne philosophers, now delivered into English tonge, with the examinations, corrections and augmentations (by W. Oughtred). 21 l.+286 pp.+2 l. ill. 12mo. London, for Richard Hawkins. *London, 1633*

Problem 67, p. 103, is the interesting part of this work, referring as it does to the variation of the compass. This translation omits the statement contained in the original edition of 1624 that along the meridian of the Fortunate Isles (the Canaries), the needle points true north and south. The magnetic telegraph is described and pictured on p. 104. The author does not believe that any magnet with such properties can be found. The action of fire and garlic on the magnet is mentioned, p. 105.

- 93c.— Another edition. Mathematical recreations; or, a collection of many problems extracted out of the ancient and modern philosophers written first in Greek & Latin, lately compil'd in French and now in English with the examinations and augmentations of divers modern mathematicians; whereunto is added, The description and use of the double horizontal dial, by William Oughtred. 9 l.+282 pp.+1 l.+19 pp. ill. pl. 12mo. London, for W. Leake. *London, 1674*

The fable about Mahomet's coffin, p. 104; magnetic declination, p. 105; sympathetic compass, p. 106; how to find the poles of a lodestone, p. 107.

—See also 101, 151.

- 94.* Fromondus, Libertus. (1587-1653.) Meteorologicorum libri sex. 6 l.+420 pp.+10 l.+4to. Antverpiæ, ex officina Plantiniana, apud Balthasarem Moretum. *Antwerp, 1627*

Pulse used in calculating distance of thunder.

95. Drebbel, C(ornelius). (1572-1634.) Ein kurtzer Tractat von der Natur der Elementen, und wie sie den Wind, Regen, Blitz und Donner verursachen. Ins Hoch Teutsch uebergesetzt durch J. E. Burggraffen. 7 l.+25 pp. ill. 16mo. Franckfurt am Mayn, C. Roetell. *Frankfort, 1628*

Short treatise on the elements, containing a chapter, p. 16, on lightning and thunder. Bound with it is a translation of the same into Dutch, followed by a tract on the *Fifth Essence* permeating all things (ether?). Drebbel spent the last fourteen years of his life in London, where he was received with favor. He constructed a submarine boat in which he made a trip from Westminster to Greenwich.

- 95a.— Grondige oplossinge van de natuuren eygenschappen der elementen en hoc sy veroorsaken donder blixem, hitte, koude, wind, regen, hagel, sneeuw etc. En waar toe sy dienstig zijn.

The Epistle Dedicatorie.

my selfe by the space of these forty yeeres, haue somewhat entred (as my leasure and occasions would serue , and at by times) partly by reading other mens writings , and partly by my owne industrie and practize : Whereby what I haue collected , and found , this little Treatise will shew. Which, whether it be any thing, or nothing, I do referre vnto the iudicious *Readers* consideration, but in special to your fauorable construction, and good acceptance.

Many yeeres since diuers of my good friends , and among them some honourable persons, were very desirous that I should publish such obseruations as I had collected, both before, and also after the setting forth of *D. Gilberts* booke : And none more earnest herein then *D. Gilbert* himselfe, vnto whom I communicated what I had obserued. of my selfe, and what I had built vpon his foundation of the *Magnetisme* of the earth. Both which hee liked well and wished me to publish them, as I remember at the time of our priuate conference, as may further appeare by letters that I receiued from him ; which I haue to shew vnder his owne hand.

But

CATALOGUE OF WHEELER GIFT

Als mede een klare beschrijving van de Quinta Essentia. Second edition. 115 pp. 12mo. Rotterdam, Adriaan van Dijk. Rotterdam, 1701

—See also 104.

- 96.† **Branca**, Giovanni. (1571-?-.) *Le machine*, volume nuovo et di molto artificio da fare effetti maravigliosi tanto spiritali quanto di animale operatione arricchito di bellissime figure con le dichiarazioni a ciascuna di esse in lingua volgare et latina. 3+40+14+23 l. ill. 4to. Roma, J. Mascardi. Rome, 1629

Collection of 63 curious engravings, 23 of which refer to hydraulic appliances and 40 to machines for various uses; contains the first suggestion of the modern steam turbine; brief descriptions in Italian and Latin.

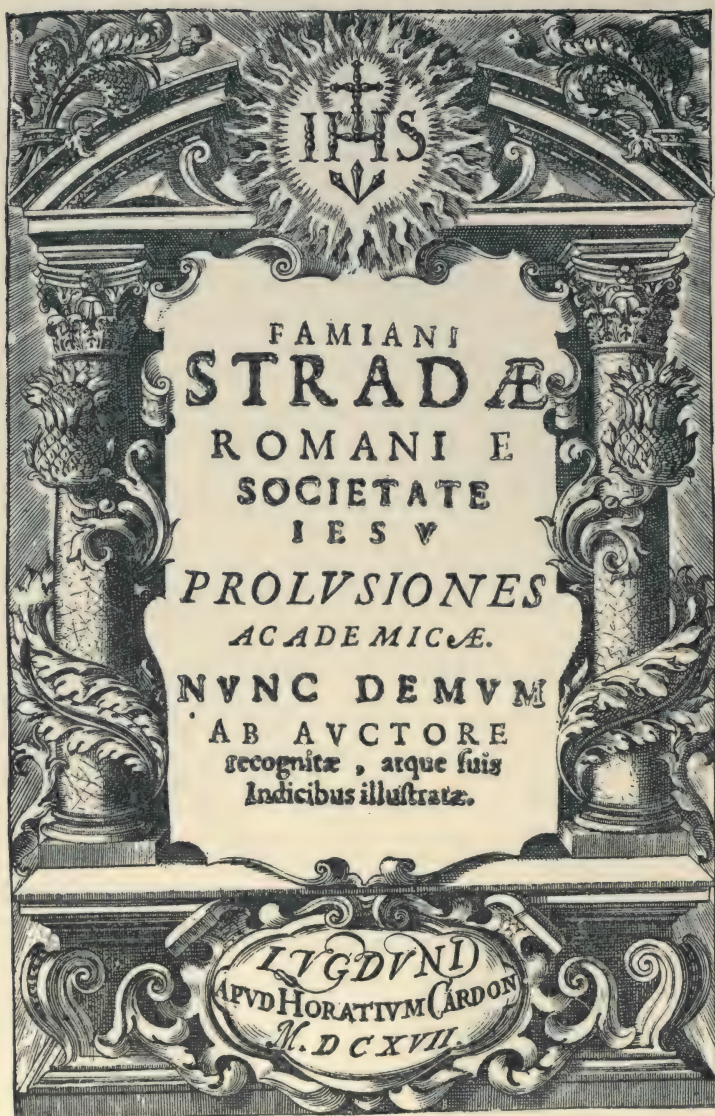
97. **Cabeo**, Nicolo. (1585-1650.) *Philosophia magnetica*, in qua magnetis natura penitus explicatur et omnium quae hoc lapide cernuntur, causae propriae afferuntur, nova etiam pyxis construatur, quae propriam poli elevationem, cum suo meridiano, ubique demonstrat, multa quoque dicuntur de electricis et aliis attractionibus et eorum causis, additis figuris variis tam aeneis quam ligno incis. 9 l.+412 pp.+6 l. ill. Folio. Coloniae, apud J. Kinckium. Cologne, 1629

On p. 194 of this famous work of the great Italian Jesuit will be found the first recognition of electrical repulsion. Gilbert's discoveries and theories are freely discussed, the latter often adversely. Sympathetic telegraphy disproved, p. 301; magnetic field mapped out by iron filings; also diagrams of the magnetic (lover's) telegraph. Cabeo (Cabaues) opposed the views of Copernicus on astronomy as well as those of Gilbert on terrestrial magnetism. Copies of this first edition, (which was also published with a *Ferrara* imprint), are much sought after. (See No. 1711.)

98. **Panciroli**, Guido. (1523-1599.) *Guidonis Pancirolli Rerum memorabilium pars prior (et posterior)*. Vol. i. *Guidonis Pancirolli Rerum memorabilium sive deperditarum pars prior commentariis illustrata*, et locis prope innumeris postremum aucta ab Henrico Salmuth. Vol. ii. *Guidonis Pancirolli jc. clarissimi Nova reperta sive rerum memorabilium recens inventarum pars posterior*. 6 l.+349 pp.+11 l.+4 l.+313 pp.+8 l. 4to. Francofurti, sumptibus Godefridi Tampachij. Frankfort, (1629)-1631

Work of the Italian jurist and antiquary on ancient arts and inventions. Vol. i. reference on p. 121 to amber as tears shed by trees and often enclosing insects. Vol. ii. the mariner's compass, p. 232; the sympathetic compasses, p. 237. The first Latin edition translated from the Italian by Salmuth was published 1599-1602.

99. **Hakewill**, George. (1579-1640.) *An Apologie or Declaration of the power and providence of God in the government of the world*. The second edition, revised, and augmented; with advertisements and tables newly annexed in the end of the



90. STRADA. (Reduced.)

CATALOGUE OF WHEELER GIFT

Book, and a frontispiece by Cecill. 20 l.+523 pp.+34 l. Folio. Oxford, William Turner. *Oxford, 1630*

The mariner's compass, p. 281; the Latin text and metrical translation of Strada's famous poem on sympathetic compasses, p. 286. (See No. 90.) Hakewill was Doctor of Divinity and Archdeacon of Surrey. (See No. 3857.)

100. **Longinus, Caesar.** (— - — .) *Trinum magicum, sive Secretorum magicorum opus.* I. De Magia Naturali, artificiosa et superstitiosa disquisitiones axiomatice. II. Theatrum Naturae praeter curam magneticam et veterum sophorum sigilla et imagines magicas, etiam conclusiones physicas, elementales, coelestes et infernales exhibens. III. Oracula Zoroastris et mysteria mysticae philosophiae Hebraeorum, Chaldaeorum, Aegyptiorum, Persarum, Orphicorum, etc., et Pythagoricorum. Accessere nonnulla secreta secretorum et mirabilia mundi, et Tractatus de proprii cuiusque nati daemonis inquisitione. 12 l.+498 pp.+2 l. 16mo. Francofurti, sumptibus Conradi Elfridi. *Frankfort, 1630*

Unimportant references to the lodestone, pp. 181-244.

101. **Mydorge, Claude.** (1585-1647.) *Examen du livre des récréations mathématiques et de ses problèmes en géométrie, mécanique, optique, et catoptrique.* Où sont aussi discutées et restablies plusieurs expériences physiques y proposées. (Notes par D(enis) H(enrion)). 8 l.+280+106 pp.+6 l. +39 pp. ill. 12mo. Paris, Robert Bouzonnet. *Paris, 1630*
This is the *Mathematical Recreations* of Van Etten (Jean Leurechon) to each problem of which the author adds remarks of his own. The sympathetic telegraph, pp. 140, 144; method of finding magnetic variation; the illustrations are numerous and ingenious.
—See also 93.

102. **Kircher, Athanasius.** (1601-1680.) *Ars magnetica hoc est disquisitio bipartita empirica seu experimentalis physico-mathematica de natura, viribus et prodigiis effectibus magnetis quam Cum theorematice, tum problematice propositam, nouâque methodo ac apodictica seu demonstratiuâ traditam, variisque usibus ac diuturnâ experientiâ comprobata faente Deo, tuebitur D. Joan-Jac. Siveighardus a Freihausen; praeside et authore Athanasio Kircher.* 4 l.+63 pp., ill. Sm. 4to. Herbipoli, typis Eliae Michaelis Zwick. *Wurzburg, 1631*

This smaller and very rare work of the celebrated German Jesuit contains remarks on Porta's sympathetic magnetic telegraph, p. 35; Strada's poem on sympathetic compasses, p. 36 (see No. 90); magnetic games and paradoxes, p. 54; superstitious magnetic practices, p. 58.

—See also 116, 158, 159, 169, 191, 247.

103. **Lehman, Abraham.** (— - — .) *Keraunologia sive fulminum theoria meteorologica.* 7 l. Sm. 4to. Witteberge, Christiani Tham. *Wittenberg, 1631*

Thesis on lightning and thunder: thunder-stones, bell-ringing during electric storms, etc.

LIBERTI FROMONDI

S. T H. L.

Collegij Falconis in Academia Louanienſi ,
Philosophiæ Profeſſoris Primarij

METEOROLOGICORVM

LIBRI SEX.



ANTVERPIÆ,
EX OFFICINA PLANTINIANA,
Apud Balthasarem Moretum, & Viduam
Ioannis Moreti, & Io. Meursium.

M. DC. XXVII.

94. FROMONDUS. (*Reduced.*)

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104. **Valentinus, Bazilius.** (Fifteenth Century.) *Conclusiones ofte Sluytredonen aller siiner Schriften ende Tractaten van Swavel Vitriol ende Magneet.* Haer by geboecht is een Tractaet van de Nature der vier elementen door Cornelis Drebbel. 111 pp., ill. Rotterdam, Jan van Waesberge. *Rotterdam, 1632*
Reference to the lodestone, pp. 34, 38; lightning and thunder, p. 83. Basil Valentine, a Benedictine monk, is often spoken of as the last of the alchemists and the first of the chemists.
—See also 95.
105. **Oddi, Muzio.** (1569–1631.) *Fabrica ed uso del compasso polimetro.* 3 l.+124 pp., ill. Sm. 4to. Milano, appresso Francesco Fobella. *Milan, 1633*
The compass referred to is the instrument used in drawing.
- 106†. **Liceti, Fortunio.** (1577–1657.) *Pyronarcha sive de Fulminum natura deque Februm origine, libri duo.* 4 l.+126 pp.+6 l. 2 plates. Sm. 4to. Patavii. *Padua, 1634*
Tract on lightning and thunder, consisting mainly of quotations from classical writers.
107. **Stevin, Simon.** (1548–1620.) *Les oeuvres mathématiques, où sont insérés les mémoires mathématiques esquels s'est exercé le tres-haut et tres-illustre Prince d'Aurenge, Gouverneur des Provinces des Pays-bas, etc. Le tout reveu, corrigé et augmenté per Albert Girard, Samiélois, mathématicien.* 4 l.+224 pp.+678 l. ill. Folio. Leyde, Bon. et Abr. Elsevier. *Leyden, 1634*
Stevin was an eminent Flemish engineer and mathematician. This volume of his collected works contains his celebrated treatises on statics and hydrostatics, as well as his great tract on "The method of finding ports" by means of the compass, p. 169. Gilbert (*De Magnete*, Book iv., chap. 9), (see No. 72), criticizes a statement made on p. 173 about the line of no variation, and approves a method invented by Stevin, p. 673, for making ports on long voyages by an accurate knowledge of the variation. Instruments for determining this variation at sea are described by Stevin on pp. 174, 175.
—See also 70 bis.
108. **Galilei, Galileo.** (1564–1642.) *Systema cosmicum, in quo quatuor dialogis de Duobus maximis mundi systematibus, Ptolemaico et Copernicano, rationibus utrinque propositis indefinite ac solide disseritur. Accessit tractatus de motu ex Italica lingua Latine conversum, (M. Berneggerus), accessit appendix gemina, qua SS Scripturae dicta cum terrae mobilitate conciliantur.* 8 l.+495 pp.+12 l., portr. 4to. Augustae Treboc, empensis Elzeviriorum. *Strasburg, 1635*
This *System of the Universe* is one of Galileo's famous works. Discredits sympathetic magnetic telegraphy, p. 88; defends Gilbert's theory that the earth is a great magnet, p. 393; experiments with armed lodestones, p. 398; why their lifting power is increased when armed, p. 400.
—See also 127.

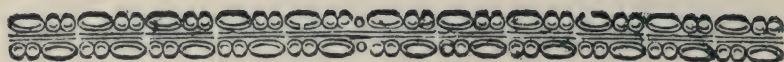
& qualibet obnubilatione impediēte effluuiū, impeditur attractio. Tertio quia non trahit vllō modo, si tegatur, aut quidlibet interponatur, quod effluuium possit impidire.

Quod autem effluuium illud sic trahat commouēdo aerem, & aer in gyrum actus rapiat corpuscula modo explicato, suadet mihi. Primo, quia si sit electrum planū, quod prepararetur in facie aliqua plana, & bene tergatur tota illa facies, deinde applicetur ad trahendum super plano corpuscula præparata facies, versorium, & corpusculula non confluent ad medium, sed ad omnes extremitates circum quaque, & ferē semper paleæ, & corpusculula longiora, si applicant vnam extremitatem ad marginem aliquam, alteram extremitatem non vertent versus medium, sed ad aliās partes: ergo signum est aerem commotum ex plano reuerti quasi in gyrum ad margines, & secum rapere corpuscula, vt dicebam. Neque est necesse, vt in ista commotione, & gyro aeris intercedat multum temporis, quod obieciebat Gilbertus. Secundo si bene præpararetur facies electri, deinde applicetur ad trahendum ferri ramenta, aut ligni, vel similia corpuscula aliqua, ita vehementer accurrent ad electrum, vt, dum ad illud perueniunt, resiliant, & non decident recta deorsum, sed repellantur procul ad distantiam trium, aut quattuor digitorum: ergo signum est motum illum corpusculorum esse ex commotione aeris, quæ oritur ex effluuio illo, à quo etiam proiciuntur procul illa corpuscula: si enim esset appulsus corpusculorum, vt loquitur Gilbertus, inualescentibus effluuijs prope electrum, resiliērent impellente impetu ad electrum, nec proijcerentur, sicuti, quia sic trahit magnes, quantum vis trahat impetu nunquam resilit ferrum, nec repellitur perueniens ad magnetem: hic vero cum appulsus corpus, resiliat etiam, signum est moueri ab externo impellente, nimirum ab aere.

Tertio non semel, neque iterum, sed sæpe, quod dicam, sum expertus præparauī faciem electri, & applicauī ad trahendam ligni scobem seu limaturam, ita autem adhærebant lignæ particule, vt efformarent quosdam velutti pilos. Obseruaui autem semper ferē extremitates illorum pilorum fluctuare, nutare, & subinde non tam decidebant extremitates illorum pilorum quam proijciebantur procul, vt manifesto obseruaui alijs etiam spectantibus: post aliqualem enim nutationem videbamus aliquas ligni particulas proijci: ergo signum est expirare effluuium, quo propellitur aer, & si corpora ad electrum accurrunt, est quia reuertens aer secum illa deferret. Quod si dicas cum Gilberto, si fieret ista aeris commotio bene præparato electro, & ad candelæ flamulam applicato, commoueretur illa flammula, quæ quolibet leui statu agitur. Respondeo hoc prouenire ex eo quod flamma effluuium illud electricum discipat, & alio auertit suavi, & directione seu ascensu; nec permittit; vt aerem in gyrum agat. Vnde non solum flammam non trahit electrum, sed nec permeantiam flammam ad se trahit aliud. Si addas, quomodo potest ex chrystal-

CATALOGUE OF WHEELER GIFT

109. **Gellibrand, Henry.** (1597-1636.) A discourse mathematical on the variation of the magneticall needle, together with its admirable diminution lately discovered. 1 l.+22 pp., ill. Sm. 4to. London, William Jones. *London, 1635*
This very scarce tract of 22 pages is of historic interest, being a record of Gellibrand's discovery in 1634 of the *secular* change in magnetic "Variation." It is here deduced from the observations of Borough and Norman in 1580, of Gunter in 1622 and his own in 1634. Gilbert held that the declination, though varying from place to place, is constant at any given place. The *daily* change was detected by George Graham in 1722 and the *annual* by Cassini between 1782 and 1791. Henry Gellibrand and Edmund Gunter (inventor of scale) were Professors of Mathematics in Gresham College, London.
- 109a.— —Facsimile edition. 7+22 pp., 4to. (Half-title:) Neudrucke von Schriften und Karten ueber Meteorologie und Erdmagnetismus (hrsg. von G. Hellmann) No. 9. Berlin, A. Asher & Co. *Berlin, 1897*
—See also 284.
110. **De L'Isle, Le Sieur, pseud.** (i.e. Chas. Sorel) (1599-1674.) Des talismans; ou figures faites sous certaines constellations, pour faire aymer et respecter les hommes, les enrichir, guérir leurs maladies, etc., avec des observations contre le livre des Cyrioseitez inovytes de M. I. Gaffarel; et un traicté de l'unguent des armes ou vnguent sympathétique et constellé. Le tout tiré de la seconde partie de la Science des choses corporelles. Par le Sieur de L'Isle. 4 l.+417 pp.+1 l. 12mo. Paris, Anthoine de Sommaille. *Paris, 1636*
Work on astrology; magnetic ointment, p. 341; action of iron on the magnet, the magnet on the pole, the heliotrope on the sun and wine on the vine, p. 350.
- 110bis. **Schwenter, Daniel.** (1585-1636.) Deliciae physico-mathematicae oder Mathematiche und Philosophische Erquickungstunden, darinnen sechshundert drey und sechzig schoene, liebliche und annehmliche Kunststuecklein, Aufgaben und Fragen auss der Rechenkunst, Landtmessen, Perspectiv, Naturkuendigung und andern Wissenschaften genommen, begriffen sind. 574 pp. Nuernberg, Jer. Duemlers. 1636.—Deliciae mathematicae et physicae. Der mathematischen und philosophischen Erquickungstunden zweyter Theil: bestehend in fuefnhundert nutzlichen und lustigen Kunstfragen, nachsinnigen Aufgaben und seroselben grundrichtigen Erklæuerungen, aus Athanasio Kircher, Petro Bettino, Marino Mersennio, Renato des Cartes, Orontio Fineo, Marino Gethaldo, Cornelio Drebbelio, Alexandro Tassoni, Santorio Sanctorii, Marco Marci, und vielen andern Mathematicis und Physicis zusammen getragen durch Georg Philipp Harsdoeffern. 620 pp. Nürnberg, Jer. Duemlern. 1677.—Deliciae philosophiae et mathematicae: Dritter Theil, bestehend in fuefnhundert



EPIGRAMMA

Ad Lectorem.



Vr Magno, minimus, minimum Magneta dicârim
Fors multis mirum est; vnica causâ fuit.
Magnus enim magnes, melius magneta minorem.
Attrahit, & melius ferra minora mouet.

Princeps est magnes, magnes magneta trahebat.
Nexu ita Sympathico iunctus vterque fuit.



ALIVD.

De acu Magneticâ.

Coelum, nosse cupis, mare, terras? Inspice; cuncta hæc
En tibi clausa suâ pyxide monstrat acus.

102. KIRCHER. P. 36. (Reduced.)

CATALOGUE OF WHEELER GIFT

Fragen. 660 pp. Nürnberg, Wolfgang der Juengere. 1692.
4to. Nuremberg, 1636-1692.

These three volumes of recreative science are a storehouse of the physical knowledge of the age. Vol. I, p. 347, repeats the idea of the lover's magnetic telegraph in which the author places no belief; part 8 treats of the magnet. The armature strengthens the magnet, vol. ii, p. 328; perpetual motion produced by magnets discredited, vol. ii, p. 404; magnetic clock, vol. ii, p. 466, being the first instance of such a piece of mechanism; vol. iii, p. 343; bell rung by what may be called the armature of a magnet.

—See also 73.

- III. (Ward, Samuel.) (1617-1689.) *Magnetis reductorium theologicum tropologicum in quo ejus novus verus et supremus usus indicatur.* 16 l.+162 pp. 1 plate, 16mo. London, impensis A. M. London, 1637

The author gives a spiritual interpretation to the various properties of the magnet. The illustrations opposite the title-page are interesting. Strada's poem is given, p. 150, followed by another, on the *golden magnet* which is said to attract not iron but gold. (See No. 90.)

- IIIIa.—(English Translation.) *The Wonders of the Loadstone, or the Loadstone newly reduc't into a divine and morall use.* (Translated from the Latin, by Sir H. Grimston.) 12 l.+281 pp. 12mo. London, P. Cole. London, 1640

- II12. Fludd, Rob(ert.) (Robertus de Fluctibus.) (1574-1637.) *Philosophia Moysaica, in qua sapientia et scientia creationis et creaturarum explicantur.* 5 l.+152 l., ill., 1 pl. Folio. Goudae, excudebat Petrus Rommazenius. Gouda, 1638

Aristotle's views on lightning and thunder refuted, l. 54; lengthy treatise on magnetism based on Gilbert, l. 97-152; curative properties of the lodestone. This work contains one of the earliest notices of the *thermometer*; Galileo's dates back to 1595. The author was an ardent Rosicrucian. An English translation appeared in 1659.

- II13.—*Responsum ad hoplocrismaspongum M. Fosteri presbiteri, ab ipso, ad unguenti armarii validitatem delendam ordinatum, hoc est, spongiae M. Fosteri expressio seu elisio.* 30+1 l. Folio. Goudae, excudebat Petrus Rommazenius.

Gouda, 1638

An answer to a clergyman in defense of the use of certain unguents. (See No. 152.)

- II14. Tarde, Jean. (— — —) *Les usages du quadrant à l'esguille aymantée, divisé en deux livres.* 61.+118 pp., ill. Sm. 4to. Paris, Jean Gosselin. Paris, 1638

Treatise on the use of the compass on land and sea. The declination is given for Sarlac, p. 17, and for Lyons, p. 19. Needles suspended on pivots and in *stirrups*, p. 28.

- II15. Bacon, Francis. (Baron Verulam.) (1561-1626.) *Of the advancement and proficiencie of learning, or, The partitions of sciences, written in Latin, interpreted by Gilbert Wats.* 20 l.+60 pp.+7 l.+477 pp.+11 l., portr. Sm. Folio. Oxford, for R. Young. Oxford, 1640

The first edition of this translation of Bacon's celebrated work appeared during his lifetime. Book iii., chap. iv., contains the author's division of



108. GALILEI. (Reduced.)

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the sciences into Physics and Metaphysics. His depreciation of mathematics and denial of the earth's rotation will be found on p. 146. Gilbert is mentioned but not belauded, pp. 115, 161.

- 116. Kircher, Athanasius.** (1602-1680.) *Magnes sive de arte magnetica opus tripartitum. Quo praeterquam quod universa Magnetis Natura, eiusque in omnibus Artibus et Scientijs usus nova methodo explicetur, è viribus quoque et prodigiosis effectibus Magneticarum, aliarumque abditarum Naturae motionum in Elementis, Lapidibus, Plantis et Animalibus elucescentium, multa hucusque incognita Naturae arcana per Physica, Medica, Chymica, et Mathematica omnis generis experimenta recluduntur. Sumptibus Hermanni Scheus sub signo Reginae.* 25 l.+916 pp.+9 l. ill. 31 plates. 4to. Romae, ex typographia Ludovici Grignani. *Rome, 1641*

In this first and rare edition of Kircher's celebrated work, the learned Jesuit deals with electrics as well as magnetics, showing great versatility and encyclopaedic knowledge. He controverts Gilbert's theories in magnetism and those of Kepler in astronomy. He was a decided anti-Copernican. The noun *magnetism* occurs frequently (first used by Barlow in 1616, see No. 89), while the compound *electro-magnetismus* is the astonishing title of a chapter beginning p. 640. The work contains many original experiments and demonstrations.

- 116a.—**—Third edition: *Magnes sive de arte Magnetica Opus tripartitum quo Universa Magnetis Natura, eiusque in omnibus Scientijs et artibus usus, nova methodo explicatur; ac praeterea e viribus et prodigiosis effectibus Magneticarum, aliarumque abditarum Naturae motionum in Elementis, Lapidibus, Plantis, Animalibus elucescentium, multa hucusque incognita Naturae per Physica, Medica, Chymica, et Mathematica omnis generis Experimenta recluduntur. Editio tertia. Ab ipso Authore recognita, emendataque, ac multis novorum Experimentorum problematis aucta.* 16 l.+618 pp.+14 l. ill. Folio. Romae, sumptibus Blasij Deversin et Zanobij Masotti Bibliopolarum. *Rome, 1654*

The second edition was published in Cologne in 1643, and the last revised edition in Rome, 1654.

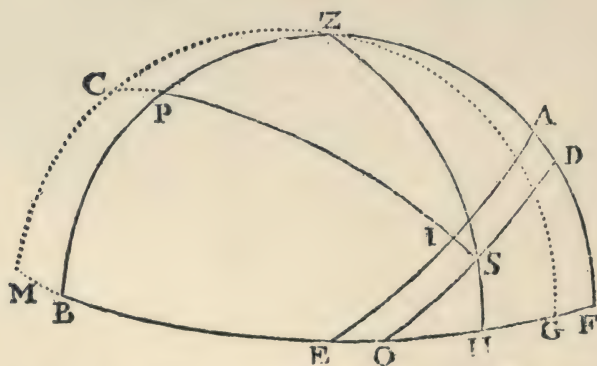
—See also 102.

- 117. Wilkins, John.** (1614-1672.) *Mercury, or The secret and swift messenger, shewing, how a man may with privacy and speed communicate his thoughts to a friend at any distance.* 7 l.+180 pp., ill. 12mo. London, for John Maynard. *London, 1641*
The author of this ingenious work refers, p. 147, to the directive, magnetic action of the earth; to induction through thick masses; and to the magnetic field. The supposed simultaneous operation of sympathetic magnets, p. 146; the efficacy of pipes and tubes for the transmission of sound, p. 133; and a description of a *phonograph* from which "the words shall come out distinctly and in the same order wherein they were spoken," p. 134.

- 117a.—**—Second edition. 7 l.+172 pp.+2 l. 12mo. London, for Rich. Baldwin. *London, 1694*

—See also 126.

By Henry Gellibrand Professor of Astronomie
in Gresham College.



Veniet tempus, quo ista quae nunc latent, in lucem dies extrahat, et longioris aevi diligentia. Sen. Nat. Quaest. lib. 7. cap. 25.

LONDON,
Printed by William Jones, dwelling in
Red-crosse-street, 1635.

109. GELLIBRAND. (Reduced.)

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118. **Descartes, René.** (du Perron.) (Renatus Cartesius.) (1596-1650.) *Epistola ad celeberrimum virum D. Gisbertum Voetium. In qua examinantur duo libri, nuper pro Voetio Ultrajecti simul editi, unus de Confraternitate Mariana, alter de Philosophia Cartesiana.* 88 pp. 4to. (Amsteldami, L. Elzevir.)

Amsterdam, 1643

In this letter, Descartes critically reviews two philosophical works written by Voet, the Dutch scholar and theologian.

—See also 128, 138, 149, 160.

119. **Goclenius, Rodolphus.** (the younger.) (1572-1621.) *Mirabilium naturae liber, concordias et repugnantias rerum in plantis, animalibus, animaliumque morbis et partibus, manifestans, nunc primo in lucem datus. Adjecta est nova defensio magneticae curationis vulnere.* 8 l.+303 pp., 12mo. Francofurti, apud J. D. Zunnerum.

Frankfort, 1643

Magnetic and electrical matters, pp. 175-209. The author, Professor of physics in Marburg, was a follower of Gilbert. (See Nos. 85, 113, 130, 152.)

—See also 85.

120. **Boodt, Anselm Boetius de.** (1550-1632.) *Le parfait joaillier, ou, Histoire des pierreries, où elles sont amplement descrites composé par Boece de Boot et de nouveau enrichi de belles annotations, indices et figures per André Toll.* (Traduit du Latin par Jean Bachow). 16 l.+746 pp.+18 l., ill. 12mo. Lyon, J. A. Huguetan.

Lyons, 1644

The first edition of this celebrated work of the Dutch mineralogist on gems and minerals was written in Latin and published in 1609. The lodestone and properties, pp. 564-612. The author disproves, p. 599, the possibility of two persons communicating with each other at a distance by means of a sympathetic, magnetic telegraph.

- 120a.—*Gemmarum et lapidum historia, quam olim edidit Anselmus Boetius de Boot, postea Adr. Tollius recensuit et commentariis illustravit. Tertia editio, cui accedunt Joannis de Laet De gemmis et lapidibus libri duo et Theophrasti liber de lapidibus, Graece et Latine.* 4 l.+576 pp.+12+32 l.+210 pp.+3 l., ill. tabl. 12mo. Lugduni Batavorum, Joannis Maire.

Leyden, 1647

The properties and uses of the lodestone and magnet are described, pp. 438-475; declination, p. 453. Latin translation of No. 120.

—See also 331.

121. **Blaeu, Guillaume.** (1571-1638.) *Le théâtre du monde; ou, Nouvel atlas contenant les cartes et descriptions de tous les pais de la terre.* 3 volumes (complete in 4). Large folio. Amsterdami, apud Johannem Guiljelmi F. Blaeu.

Amsterdam, 1645

Translation of the extensive work of the Dutch geographer and typographer on the origin, history, civilization, industries and trade of the various countries of the world with numerous maps—political, historical and topographical.





Quod Teuto, Ausonius. quod Graius, Hebraeus, Arabsq;
 Quod Syrus, Assyrius fiantur, multi: unius omne
 SCHWENTERI a lingua manat. Quid; quod docet artem
 Euclidis: tum quæ mysteria docta mathesis.
 Suggestit. HUNC spectandum offert heic Cuius Apelles.

110bis. SCHWENTER. Portrait. (See No. 4377.)



*FLVDDVS hic ille est, quo gaudet terra Britanna,
 Quigè Macraoniâ clarus in arte micat* D.P

112. FLUDD. (See No. 4377.)

CATALOGUE OF WHEELER GIFT

122. **Grandamicus**, Jacobus. (1588-1672.) *Nova demonstratio immobilitatis terrae petita ex virtute magnetica. Et quaedam alia ad effectus et leges magneticas, usumq., longitudinum et universam geographiam spectantia, de novo inventa.* 4 l.+170 pp., ill., 9 plates. Sm. 4to. Flexiae, apud Georgium Griveau.
La Flèche, 1645

The object of this work may be gathered from the following syllogism: No magnetic body rotates around its poles; the earth possesses magnetic properties as shown by Gilbert, therefore it does not turn around its poles—a denial of the rotation of the earth. The author held strong anti-Copernican views. The engravings are numerous and interesting.

123. **Browne** (Sir) Thomas. (1605-1682.) *Pseudodoxia epidemica; or, Enquiries into very many received tenets and commonly presumed truths.* 10 l.+286 pp. Folio. London, for Edward Dod.
London, 1646

The author concludes from his own experiments that communication at a distance by means of sympathetic needles is impossible. He also writes down such illusions and fables as the flesh magnet, p. 67; the garlic anti-magnetic effluvium, p. 67; suspension of Mahomet's coffin, p. 71. Gilbert's views are everywhere upheld. On p. 51 occurs for the first time in English the term *electricity*, and on p. 79 the plural form, *electricities*. Sir Thomas Browne was the author of *Religio Medici*.

124. **Regius**, Henricus. (Le Roy.) (1598-1679.) *Fundamenta physices.* 8 l.+306 pp.+1 l., ill. Sm. 4to. Amstelodami, apud Ludovicum Elzevirium.
Amsterdam, 1646

Treatise on general physics and physiology, with 15 pages on the magnet. Numerous magnetic diagrams from Descartes.

—See also 139.

125. **Laet**, J(an) de. (1593-1640.) *De gemmis et lapidibus libri duo, quibus praemittitur Theophrasti liber de lapidibus, Graece et Latine.* 32 l.+210 pp., ill., 12mo. Lugduni Batavorum, ex officina Joannis Maire.
Leyden, 1647

Work on gems and minerals; no reference to the lodestone.

—See also 331.

126. **Wilkins**, John. (1614-1672.) *Mathematicall magick; or, The wonders that may be performed by mechanick geometry.* In two books. Concerning mechanical powers, motions, Being one of the most easie, pleasant, useful, and yet most neglected part of mathematicks. Not before treated of in this language, by J. W. 7 l.+295 pp., ill. 12mo. London, by M. F., for Sa. Gellibrand.
London, 1648

Chap. xiii. of this work on mechanical contrivances deals with attempts made to obtain perpetual motion by means of magnets. The efforts of Peregrinus and Cardan to solve the problem are mentioned and the opinion of Gilbert given, *viz.*: that it is "a vain and groundless fancy," p. 258. Wilkins, Bishop of Chester, was one of the founders of the Royal Society, of which he was the first secretary.

640 LIB. III. MVNDI SIVE CATENÆ MAGN. PARS III.

Elementarium
actiones.

gitur, & ita mira quadam vicissitudine vnum alterum conseruat; vnde ordine præpostero, vt supra demonstratum est, denudò transmutantur, & ex se inuicem fiunt, facilis enim est transitus, postquam communem nacta sunt qualitatem, vt ignis & aër per calorem; his autem opposita difficiliùs vertuntur. Atque ex his suppono secundò. Ex calido & frigido oriri rarefactionem & condensationem, ex quibus omnium elementarium motiones promanare supra diximus, vt cum calidum in mistum aliquod agens educit impurum, & dum suæ actioni idoneum reddere tentat, vt simplicius fiat, euadit tenue; ita frigidum conseruat, constringit, & congelat, vnde calidum misti humorem ex centro elicit ad circumferentiam, frigidum verò eundem ex circumferentia ad centrum retrahit; ex quibus quidem qualitaribus perpetuus in aëre motus causatur. Vapidum enim rarefactum, calore fugat frigidum circumstās: remisso vero calore frigidum constrictum locum suum repetit, & consequenter secum consistentia corpuscula denehit. Atque hac ratione omnia electrica trahere iam tempus est, vt declaremus.

C A P V T III.

Ηλεκτρο-μαγνητισμός,

id est

De Magnetismo electri, seu electricis attractionibus earumque causis.

Electrum Græcis eò, quod ad se attritu priùs calefactum paleas attrahat, *ἤλεκτρον*, vnde & *ἄρπάζ*, seu raptor dicitur, Latinis Succinum à flauo succo ex quo coagulatur, Arabibus Karabeh, eo quod in sacrificijs offerri esset solitum, vi illa sua attractiua, qua Magnetem æmulatur, nullo non tempore, summæ fuit Philosophis admirationi, adeoq; in hunc diem durat, vt vix in natura rerum exoticus effectus sit, cuius ignotam causam per Magnetem, & succinum (quæ sunt commune ignorantiae asylum, & sacra veluti anchora) non in patrociniū sibi adfiscant; Electrum igitur, seu succinum, aut vulgò Ambra dictum paleas trahit; & leuissima quæuis corpuscula, res

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- 126a.**—Another edition. 7 l.+295 pp., ill. 12mo. London, by H. F., for Sa. Gellibrand. *London, 1680*
 Submarine navigation, chap. v, p. 178; use of compass in steering a *submarine* boat, p. 183.
 —See also 117.
- 127.** **Galilei**, Galileo. (1564-1642.) *Le operazioni del compasso geometrico ed militare.* Ed. III. 4 l.+80 pp., 1 plate. 4to. Padova, P. Frambotto. *Padua, 1649*
 The instrument here referred to is not the magnetic compass but a sort of Gunter's scale.
 —See also 108.
- 128.** **Descartes**, René. (du Perron.) (Renatus Cartesius.) (1596-1650.) *Principia philosophiae.* (Part III. of *Opera Philosophica.* Editio secunda ab auctore recognita.) 21 l.+302 pp., ill. Sm. 4to. Amstelodami, apud Ludovicum Elzevirium. *Amsterdam, 1650*
 Parts iii. and iv. of this work on fundamental philosophy contain the author's views on the mechanism of the solar system together with his famous theory of vortices. (See No. 139.)
- 129.**—*Specimina philosophiae seu dissertatio de methodo recte regendae rationis, et veritatis in scientiis investigandae dioptrice et meteora.* (Part IV of *Opera Philosophiae.* Editio secunda ab auctore recognita) Ex Gallico translata. 8 l.+316 pp., ill. Sm. 4to. Amstelodami, apud Ludovicum Elzevirium. *Amsterdam, 1650*
 The views of Descartes on magnetism will be found on p. 266, *et seq.*, illustrated by diagrams showing the continuity of magnetic particles through a lodestone with the particles in the field of force. These particles, screw-like in form, are in constant whirling motion. Reference will also be found to lightning and thunder; St. Elmo's fires; summer lightning; the ringing of bells and firing of guns during a thunderstorm.
- 129a.**—*Discours de la méthode pour bien conduire sa raison, et chercher la vérité dans les sciences. Plus la dioptrique et les météores qui sont des essais de cette méthode.* 294 pp.+13 l. Sm. 4to. Paris, Henry le Gras. *Paris, 1658*
 The first edition appeared in 1637. Lightning and thunder, p. 236; St. Elmo's fires, a good omen, p. 239; thunder-clouds broken up by ringing bells and firing guns, p. 245.
 —See also 118.
- 130.** **Helmont**, Joh(ann) Bapt(ist) van. (1577-1644.) A ternary of paradoxes, the magnetick cure of wounds, nativity of tartar in wine, image of God in man. Written originally by Joh. Bapt. Van Helmont, translated, illustrated, and amplified by W(alter) Charleton. 26 l.+147 pp. Sm. 4to. London, J. Flesher, for William Leo. *London, 1650*
 This quaint work of the renowned Dutch alchemist treats of supposed curative powers of the lodestone together with a few of its real properties. pp. 39-43. On p. 77 of this translation by Dr. Charleton the noun *electricity* occurs for the second time in the singular number; Sir Thomas Browne used the term both in the singular and plural in 1646 (See 123). The term

Fabul. 9.

Horne to discover the irruption of the enemy.

There is another experiment to this purpose mentioned by *Walchius*, who thinks it possible so to contrive a trunk or hollow pipe, that it shall preserve the voice entirely for certain houres or days; so that a man may send his *words* to a friend instead of his *writing*. There being always a certaine space of intermission; for the passage of the voice, betwixt its going into these cavities, and its coming out; hee conceives, that if both ends were seasonably stopped, whilst the sound was in the midst, it would continue there till it had some vent. *Huc tubo verba nostra insusurremus, & cum probe munitur tabellario commitamus, &c.* When the friend to whom it is sent, shall receive and open it, the words shall come out distinctly, and in the same order wherein they were spoken. From such a contrivance as this, (saith the same Authour) did *Albertus Magnus* make his Image, and Frier *Bacon*, his brazen Head, to utter certaine words.

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hypnotick occurs, p. 81. To van Helmont we are indebted for the term *gas*, "geist." (See Nos. 85, 113, 119, 141, 152.)

—See also 152.

131. **Gilbert, William.** (1544-1603.) *Guilielmi Gilberti Colcestrensis, medici regii, De mundo nostro sublunari philosophia nova. Opus posthumum, ab auctoris fratre collectum pridem et dispositum, nunc ex duobus MSS. codicibus editum, ex museo viri perillustri Guilielmi Boswelli Equitis aurati, etc., et oratoris apud Foederatos Belgas Angli.* 7 l.+316 pp.+2 l., 1 plate, ill. 4to. Amstelodami, apud Ludovicum Elzevirium.

Amsterdam, 1651

This work was published forty-eight years after Gilbert's death, having been edited by his brother, William Gilbert of Melford; or, as some say, by John Gruter, the great humanist and critic. Gilbert's aversion for the philosophy of Aristotle is well shown throughout.

—See also 72.

132. **Reael, Laurens.** (fl. 1650.) *Observation of ondervindingen aen de magneetsteen en de magnetische kracht der aerde. Quibus adjunctae sunt celeberrimi Professoris D. Casparis Barlaei Causae et rationes observationum earundem magneticarum.* 8 l.+91 pp., ill. 12mo. t'Amsterdam, Lodowijck Spillebout.

Amsterdam, 1651

Collection of magnetic experiments made by the author. The earth as a great magnet, p. 20; polarity of the compass-needle, p. 48; distinction between magnetic and electric attraction, p. 77. The propositions are stated in Latin, the explanations are given in Dutch.

- 133*. **Riccioli, G(iovanni) B(attista).** (1598-1671.) *Almagestum novum. Astronomiam veterem novamque continens observationibus aliorum, et propriis novisque theorematibus, problematibus, ac tabulis promotam in tres tomos distributam quorum argumentum sequens pagina explicabit.* Vol. I (complete in 3 parts), ill. Folio. Bononiae, ex typographia Haeredis Victorii Renatij.

Bologna, 1651

Voluminous work on astronomy in which the author, an Italian Jesuit, adduces reasons against the Copernican system.

134. **Ross, Alexander.** (1590-1654.) *Arcana Microscosmi; or, The hid secrets of man's body disclosed; first in an anatomical duel between Aristotle and Galen about the parts thereof, secondly by a discovery of the strange diseases, symptoms and accidents of man's body. With a refutation of Doctor Brown's vulgar errors and the ancient opinions vindicated.* 7 l.+292 pp. 24mo. London, Thomas Newcomb. *London, 1651*

Reference to the mariner's compass, p. 274.

136. **Nicols, Thomas.** (fl. 1659.) *A lapidary; or, The history of precious stones with cautions for the undeceiving of all those that deal with precious stones.* 15 l.+239 pp. tab. Sm. 4to. Thomas Buck.

London, 1652

Interesting matter about amber and jet, pp. 165-172; the lodestone, pp. 195-207. The work was reprinted in 1653 and 1659 with different title pages.

dosis, extracteth the magistery of wine, after foure moneths digestion in horsedunge, exposing it unto the extremity of cold, whereby the aqueous parts will freeze, but the Spirit retyre and be found uncongealed in the center.

Againe, the difference of their concretion is not without reason, collectible from their dissolution, which being many wayes performable in Ice, is not in the same manner effected in CrySTALL. Now the causes of liquation are contrary to those of concretion, and as the atoms and indivisible parcels are united, so are they in an opposite way disjoyned. That which is concreted by exiccation or expression of humidity, will be resolved by humectation, as earth, dirt, and clay; that which is coagulated by a fiery siccity, will suffer colliquation from an aqueous humidity, as salt and sugar, which are easily dissoluble in water, but not without difficulty in oyle, and well rectified spirits of wine. That which is concreted by cold, will dissolve by a moist heat, if it consist of watery parts, as Gums, Arabick, Tragacanth, Ammoniac, and others, in an ayrie heat or oyle, as all resinous bodies, Turpentine, Pitch, and Frankincense, in both as gummy resinous bodies, Masticke, Camphire, and Storax; in neither, as neutralls and bodies anomalous hereto, as Bdellium, Myrrhe and others. Some by a violent dry heat, as metallals, which although corrodible by waters, yet will they not suffer a liquation from the powerfullest heat, communicable unto that element. Some will dissolve by this heat although their ingredients be earthy, as glasse, whose materials are fine sand, and the ashes of Chali or Fearn, and so will salt runne with fire, although it bee created by heat; and this way alone may bee effected a liquation in CrySTALL, but not without some difficulty; that is, calcination or reducing it by Arte, into a subtile powder, by which way and a vitreous commixture, glasses are sometime made hereof, and it becomes the chiefeft ground for artificiall and factitious gemmes; but the same way of solution is common also unto many stones, and not only Berylls and Cornelians, but flints and pebbles, are subject unto fusion, and will runne like glasse in fire.

But Ice will dissolve in any way of heat, for it will dissolve with fire, it will colliquate in water, or warme oyle; nor doth it only submit to an actual heat, but not endure the potentiall calidity of many waters; for it will presently dissolve in *Aqua fortis*, sp. of vitriell, salt or tartar, nor will it long continue its fixation in spirits of wine, as may be observed in Ice injected therein.

Againe, the concretion of Ice will not endure a dry attrition without liquation; for if it be rubbed long with a cloth it melteth; but CrySTALL will casefly unto electricity, that is a power to attract straws or light bodies, and convert the needle freely placed; which is a declaration of very different parts, wherein wee shall not at present

G 2

inlarge.

CATALOGUE OF WHEELER GIFT

137. **Charleton, Walter.** (1619-1707.) *Physiologia Epicuro-Gassendo-Charltoniana*; or, A fabrick of science natural, upon the hypothesis of atoms, Founded by Epicurus, Repaired by Petrus Gassendus, Augmented by Walter Charleton. Part 1 (all published.) 475 pp., ill. Folio. London, Tho. Newcomb, for Thomas Heath. *London, 1654*
Comprehensive inquiry into the nature of things. Electrical attraction, p. 345; the torpedo, p. 375; Grandami criticized, p. 410; magnetic declination, p. 410; magnetic polarity, p. 411.
138. **Descartes, René.** (du Perron.) (Renatus Cartesius.) (1596-1650.) *Meditationes de prima philosophia, in quibus Dei existentia, et animae humanae a corpore distinctio, demonstrantur.* His adjunctae sunt variae objectiones doctorum virorum in istas de Deo et anima demonstrationes; cum responsionibus authoris. Cum appendice; Epistola ad Gisbertum Voetium. 6 l.+191+164+88 pp. Amstelodami, apud Ludovicum Elzevirium. *Amsterdam, 1654*
Metaphysical work in which the author demonstrates the fundamental principles of religion and philosophy; first edition, 1641.
—See also 118.
139. **Regius, Henricus.** (Le Roy.) (1598-1679.) *Philosophia naturalis.* Editio secunda, priore multo locupletior et emendatior. 22 l.+442 pp., ill. 4to. Amstelodami, apud Ludovicum Elzevirium. *Amsterdam, 1654*
General properties of magnets with illustrations, pp. 206-221. The illustrations are noteworthy, particularly the one on p. 207, which shows the lines of force around the magnet as well as the lines of induction through it, cf. *Principia Philosophiae* of Descartes, 2nd edition, p. 266. (See No. 128.)
—See also 124.
140. **Albertus Magnus.** (1205-1280.) *De secretis mulierum, item de virtutibus herbarum lapidum et animalium.* 358 pp.+7 l. 16mo. Amstelodami, apud Jodocum Janssonium. *Amsterdam, 1655*
Work on herbs and animals; reference to one of the mythical properties of the lodestone, p. 144.
—See also 3.
141. **Irvine, C(hristopher).** (1638-1685.) *Medicina magnetica, or, The rare and wonderful art of curing by sympathy laid open in aphorismes; proved in conclusions; and digested into an easy method, drawn from both; wherein the connexion of the causes and effects of these strange operations are more fully discovered than heretofore.* All cleared and confirmed by pithy reasons, true experiments, and pleasant relations; preserved and published as a masterpiece in this skill. 6 l.+110 pp., 12mo. Edinburgh, C. Higgins. *Edinburgh, 1656*
Among subjects treated are: "A magical magnetisme out of the famous Van Helmont"; "The magical magnetisme of the tarantula"; "The magnetisme of the magnet." This last is an unimportant paragraph about the lodestone. (See No. 130.)

PHYSIOLOGIA
 Epicuro-Gassendo-Charltoniana:
 OR
 A FABRICK
 OF
 SCIENCE NATURAL,
 Upon the Hypothesis of
 A T O M S,

Founded }
 Repaired } by
 Augmented } {EPICURUS,
 {PETRUS GASSENDUS,
 {WALTER CHARLTON,

Dr. in Medicine, and Physician to the late
 CHARLES, Monarch of
 Great-Britain.

The FIRST PART.

Fernelius, in præfat. ad lib. 2. de Abditis rerum Causis.

Atomos veteres jam ridemus, miramurq; ut sibi quisquam persuaserit, Corpora quædam solida, atque individua, fortuita illa concursione, res magnitudine immensas, varietate multisindinq; infinitas, omnemq; absolutissimum hunc Mundi ornatum effecisse. At cerè, si Democritus mortem cum vita commutare posset, multò acutius hæc, quæ putamus Elementa, suo more rideret.

LONDON,
 Printed by Tho: Newcomb, for Thomas Heath, and
 are to be sold at his shop in Russel-Street,
 near the Piazza of Covent-Garden.

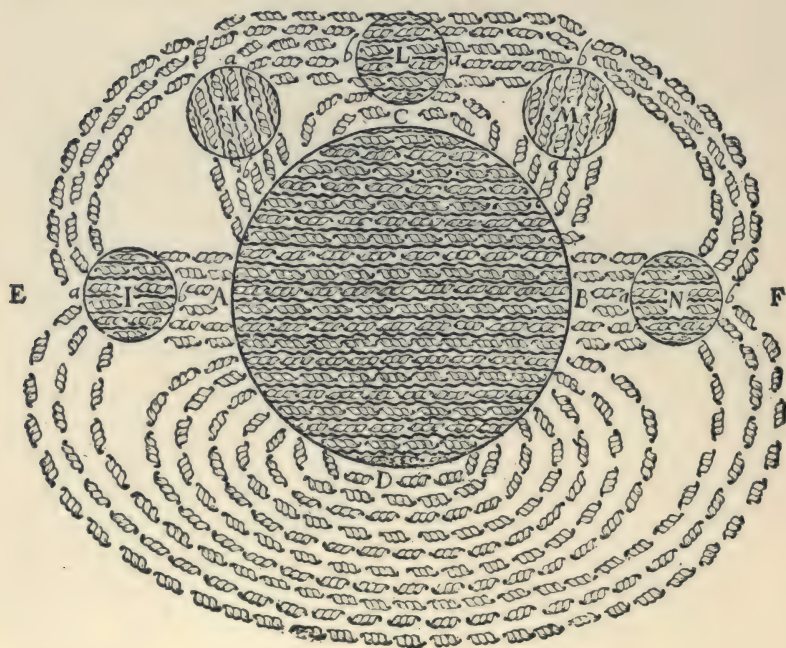
1654.

137. CHARLTON. (Reduced.)

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142. Schott, Gaspar. (1608-1666.) *Mechanica hydraulico-pneumatica, qua praeterquam quod aequi elementi natura, proprietas, vis motrix, atque occultus cum aere conflictus, a primis fundamentis demonstratur: omnis quoque generis experimenta Hydraulico-pneumatica recluduntur: et absoluta machinarum aqua et aere animandarum ratio ac methodus praescribitur Opus bipartitum. Accessit experimentum novum magdeburgicum quo vacuum alii stabilire, alii evertere conantur.* 161.+488 pp.+81., ill., 58 pl. 4to. Herbipoli, excudebat Henricus Pigrin. *Wurzburg, 1657*
 Part i., p. 354, description of Kircher's magnetic device to show the hour of the day. Part ii., p. 444, contains the *first* printed account of von Guericke's air-pumps and some experiments made with it, showing the pressure of air (the half-title bears the date 1658). (See No. 170.)
 —See also 150, 155bis, 159, 184, 190, 531.
143. Turner, Robert. (fl. 1654-1665.) *An astrological catechisme wherein the art of judicial astrology is fully demonstrated by way of question and answer. Written originally in Latin. Collected and Englished by R. Turner.* pp. 141-168. 12mo. London, J. Cottrel. *London, 1657*
 A series of questions on astrology with answers.
- 144.—*Ars notoria: the notory art of Solomon shewing the cabalistical key of magical operations, the liberal sciences, divine revelation, and the art of memory. Whereunto is added: An astrological catechism, etc.* (See No. 143.) 168 pp. 12mo. London, J. Cottrel. *London, 1657*
 Bombastic work; sympathetic compasses and their uses, p. 136.
145. Digby, (Sir) Kenelm. (1603-1665.) *A late discourse made in a solemne assembly of nobles and learned men at Montpellier in France touching the cure of wounds by the powder of sympathy, with instructions how to make the said powder, whereby many other secrets of nature are unfolded. Rendered out of French into English by R. White.* 5 l.+152 pp. +1 l. 16mo. London, for R. Lowndes and T. Davis. *London, 1658*
 The cure of wounds by the powder of sympathy has been ranked among the follies of science; p. 54 contains a reference to magnetic and electric attractions; p. 95, to acoustical resonance; p. 112, to ripples produced on the surface of water in a glass vessel when *rubbed with the finger*. (See No. 152.) A French edition was printed the same year as this first English edition.
 —See also 156.
- 146†. Boyle, Robert. (1627-1691.) *The sceptical chymist, or Chymico-Physical doubts and paradoxes touching the Stagyrists principles commonly call'd hypostatical as they are wont to be propos'd and defended by the generality of Alchymists. Whereunto is praemis'd part of another discourse relating to*

quidem præterpropter, sed diversos tamen meatus, diversasque fibrillas tenuissimas in iis eminentes, & diversimodè inclinatas, atque ad figuram & transitum suum aptissimè conformatas, diutinâque morâ bene confirmatas, perpetuò inveniens, celerrimè per ejus substantiam feratur: ipsum verò per poros circa A vel B egressa, quia



per aerem, aquam & reliquam Tellurem satis commodè moveri non potest, resilit, vorticemque utrimque in contrarium, ab australi parte, A, per C & D, versus borea-

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the same subject. 13 l.+436 pp., 12mo. London, J. Caldwell, for J. Crooke. *London, 1661*

First edition, now very rare. In this work, Boyle seeks to subvert the accepted theory of matter. His atoms have different forms and sizes.

—See also 154, 163, 167, 172, 174, 178, 187, 203.

147. **Glanvill, Jos(eph).** (1636-1680.) The vanity of dogmatizing; or, Confidence in opinions, manifested in a discourse of the shortness and uncertainty of our knowledge and its causes. With some reflections on peripateticism, and an apology for philosophy. 16 l.+250 pp.+3 l., 12mo. London, for Henry Eversden. *London, 1661*

Magnetic telegraphy possible, p. 203; magnetic cure of wounds, p. 207. Glanvill was an eminent divine and Fellow of the Royal Society.

- 147a.—**Scepsis Scientifica, or Confest ignorance, the way to science; in an essay of the vanity of dogmatizing, and confident opinion, with a reply to the exceptions of the learned Thomas Albius.** 2 parts. 17 l.+184 pp.+8 l.+92 pp. Sm. 4to. London, Henry Eversden. *London, 1665*

Extension of the author's "Vanity of Dogmatizing;" sympathetic magnetic telegraphy possible, p. 149. The second part has a separate title page, with an "i" under the "c" of *Scire*. (See No. 147b.)

- 147b.—**Scire tuum nihil est; or, The author's defence of the vanity of dogmatizing against the exceptions of the learned Tho. Albius in his late Sciri.** 8 l.+92 pp. Sm. 4to. London, for Henry Eversden. *London, 1665*

Critique of the philosophy of Aristotle.

- 148.* **Conradi, Elias** (———) and **Joh. Christophorus Laurentius.** (———.) *Ex physicis. De igne.* 8l. Sm. 4to. Witteberge, J. Haken. *Wittenberg, 1662*

Pamphlet on fire as one of the elements.

149. **Descartes, René** (du Perron). (Renatus Cartesius.) (1596-1650.) *De homine figuris et latinitate donatus a Florentio Schuyt.* 18 l.+121 pp., 10 plates. 4to. Lugduni Batavorum, apud Fr. Moyardum & Petrum Leffen. *Leyden, 1662*

A short treatise on physiology.

—See also 118.

150. **Schott, Gaspar.** (1608-1666.) *Physica curiosa, sive mirabilia naturae et artis libri XII comprehensa, quibus pleraq; quae de angelis, daemonibus, hominibus, spectris, energumenis, monstis, portentis, animalibus, meteoris, etc., rara arcana, curiosaque circumferuntur, ad veritatis trutinam expenduntur, variis ex historia ac philosophia petitis disquisitionibus excutuntur, et innumeris exemplis illustrantur.* 31 l.+1583 pp.+15 l., pl. Sm. 4to. Herbipoli, sumptibus Johannis Andreae Endteri, per J. Hertz. *Wurzburg, 1662*

Voluminous work of the distinguished German Jesuit on the wonders of animate nature and of physical phenomena. St. Elmo's fires occurring singly forebode evil, pp. 1428-1431; lightning and thunder, p. 1453; thunder-stone, p.



142. SCHOTT. (Reduced.)

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1467; trees liable to be struck by lightning, p. 1469; odor caused by lightning-flash, p. 1457; rarity of electric storms in winter, p. 1456.

—See also 142.

151. **Westen, Wynant van.** (— — .) *Mathematische vermaecklyckheden, te samen ghevoeght van verscheyden ghenuchelijcke ende voertighe werkstukken.* 3 parts. (Deel I. by H. van Etten), ill. 12mo. Arnheim, Jacob van Briesen.

Arnheim, 1662-1663

The lodestone, p. 125; Mahomet's coffin, p. 127; sympathetic compasses, p. 128; attractive power of lodestone may be increased, p. 129 (parts 2 and 3 are dated 1662). (See No. 1711.)

—See also 93.

152. **Theatrum** sympatheticum auctum, exhibens varios autores, de pulvere sympathetico quidem: Digbaeum, Straussinum, Papinium, et Mohyum de unguento vero armario: Goclenium, Robertum, Helmontium. Praemittitur his Sylvestri Rattrij aditus ad Sympathiam et anti-pathiam descriptionem simul exponens. (Edited by A. Tentzel). 4 l.+722 pp.+21 l. 4to. Norimbergae, apud Johan. Andream Enderum.

Nuremberg, 1662

Collection of tracts by different authors on the *Weapon Salve* and the *Powder of Sympathy*. Frequent references to amber and the magnet; sympathetic compasses, p. 546. (See Nos. 113, 119, 130, 145.)

153. **Harvey, Gideon**, (also Harvy.) (1640 (?)–1700.) *Archelogia philosophica nova, or, New principles of philosophy containing Philosophy in general, Metaphysics, or Ontology; Dynamology, or A discourse of power; Religio philosophi, or Natural theology; Physicks, or Natural philosophy.* 25 l.+103 pp.+128 pp.+1 l.+441 pp., ill. Sm. 4to. London, for Samuel Thomson.

London, 1663

Properties of the magnet, the sailing compass, magnetic effluvium, pp. 240-260. The author was an eminent physician.

154. **Boyle, Robert.** (1627-1691.) *Some considerations touching the usefulness of experimental natural philosophy.* Second edition. (Edited by R. Sharrock), 2 vols. Sm. 4to. Oxford, for R. Davis.

Oxford, 1664-1671

Writers on magnetism, p. 15; magnetic phenomena, p. 226. Only Part i. belongs to the second edition; the first edition was published in 1663.

—See also 146.

155. **Power, Henry.** (1623-1668.) *Experimental philosophy, in three books containing new experiments—microscopical, mercurial, magnetical with some deductions, and probable hypotheses raised from them in avouchment and illustration of the now famous atomical hypothesis.* 12 l.+193 pp., ill., 2 plates. Sm. 4to. London, for John Martin & J. Allestry.

London, 1664

The author refutes, pp. 153-170, Grandami, who strove to prove the immobility of the earth by reason of its being a colossal globular magnet. (Each book has a separate title-page, dated 1663.)

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course is a reputed *'impossibility*, but yet there are some hints in natural operations that give us probability that 'tis feasible, and may be compass'd without unwarrantable assistance from *Demoniack* correspondence. That a couple of *Needles* equally touch'd by the same *magnet*, being set in two *Dyals* exactly proportion'd to each other, and circumscribed by the Letters of the *Alphabet*, may effect this *magnale*, hath considerable authorities to avouch it. The manner of it is thus represented. Let the friends that would communicate take each a *Dyal*: and having appointed a time for their *Sympathetick* conference; let one move his impregnate *Needle* to any letter in the *Alphabet*, and its affected fellow will precisely respect the same. So that would I know what my friend would acquaint me with; 'tis but observing the letters that are pointed at by my *Needle*, and in their order transcribing them from their *sympathized Index*, as its motion direct's: and I may be assured that my friend described the same with his: and that the words on my paper, are of his

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- 155[†]bis. Schott, Caspar. (1608-1666.) *Technica curiosa, sive mirabilia artis, libris xii.* 22 l.+1044 pp.+8 l., ill., portrait. Sm. 4to. Norimbergae, sumptibus Johannis Andreae Endteri & Wolfgangi junioris Haeredum. *Nuremberg, 1664*

The subjects treated are as follows: Guericke's Magdeburg experiments; Boyle's experiments; experiments of Torricelli and others with mercury vacua; hydro-pneumatic experiments; mechanical marvels; secret writing; problems in cyclometry; chronometers; perpetual motion; miscellaneous marvels; cabalistic writing. The portrait is that of John Philip, Archbishop of Mayence, to whom there is a poetical dedication. The end sheet gives a list to date of the works of this voluminous writer, which number thirteen, all published between 1657 and 1664.

—See also 142.

156. Digby, (Sir) Kenelm. (1603-1665.) Two treatises: in the one of which the nature of bodies; in the other, the nature of man's soule is looked into: in way of discovery of the immortality of reasonable soules. 24 l.+429 pp.+5 l.+145 pp. Sm. 4to. London, for John Williams. *London, 1665*

The artificial theories of Kenelm Digby, like those of Descartes, his friend, have long been abandoned. Odor emitted by electrical bodies, p. 216; Cabacus criticised, p. 216; the lodestone, p. 218; induction due to earth, p. 242; variation of magnetic declination, p. 250. First treatise, preface dated 1644. Second treatise, title-page dated 1645. The first edition was printed in Paris, 1644; the second edition in London, 1658.

—See also 145.

157. Jonston, Joh(ann). (1603-1675.) *Thaumatographia naturalis in decem classes distincta.* Editio altera. 495 pp.+3 l. 16mo. Amstelodami, apud Johannem Janssonium. *Amsterdam, 1665*

Work on natural wonders. Chap. xv. is devoted to the lodestone. The line of no magnetic declination is given on p. 150 as lying 10° west of the Fortunate Isles (the Canaries).

158. Kircher, Athanasius. (1601-1680.) *Magneticum Naturae regnum, sive disceptatio Physiologica De triplici in Natura rerum Magnete, juxta triplicem eiusdem Naturae gradum digesto Inanimato Animato Sensitivo Qua Occultae prodigiosarum quarundam motionum vires et proprietates, quae in triplici Naturae oeconomia nonnullis in corporibus noviter detectis obseruantur, in apertam lucem eruuntur, et luculentis argumentis, experientia duce, demonstrantur.* Ad Inclytum, et Eximium Virum Alexandrum Fabianum Novi orbis Indigenam. 10 l.+201 pp.+3 l. 12mo. Amstelodami, ex officina Johannis Janssonii a Waesberge et Viduae Elizei Weyerstraet. *Amsterdam, 1667*

The author holds that every material in the world, organic or inorganic, is magnetic—i.e., has some power of attracting or repelling. Hence the division into animal magnetism and mineral magnetism. The sun is considered to be the most magnetic of all bodies. See Secs. ii. and iii., also the title-page.

—See also 102.



P. ATHANASIVS KIRCHERVS FVLDENSIS

ê Societ: Iesu Anno ætatis LIII.

Honoris et observantiæ ergò sculpsit et D.D. C. Bloemaert Romæ 2 May A. 1655.

158. KIRCHER. (See No. 4377.)

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159. (Schott, Gaspar.) (1608-1666.) *Joco-Seriorum naturae et artis sive magiae naturalis centuriae tres* (auctore Aspasio Carameuli, i.e., Gaspar Schott); cui accessit *Diatribes de Crucibus* (A. Kircheri). 3 l.+304 pp.+1 l.+pp. 305-363+4 l., 22 plates. 4to. Francofurti, apud Joannem Arnoldum Cholinum.
Frankfort, 1667
Collection of curious experiments in physics and secret writing.
—See also 102, 142.
160. Descartes, René. (du Perron.) (Renatus Cartesius.) (1596-1650.) *Epistolae*; partim ab auctore Latino sermone conscriptae, partim ex Gallico translatae. 2 parts in 1 vol., ill., pl. 4to. Londini, impensis Joh. Dunmore. *London, 1668*
These letters contain references to magnetic phenomena. Part i., p. 101; Part ii., pp. 150, 202, 365, and 403.
—See also 118.
161. Leotaud, Vincent. (1595-1672.) *Magnetologia in qua exponitur nova de magneticis philosophia*. 2 l.+420 pp.+3 l., ill. 4to. Lugduni, sumptibus Laurentii Anisson. *Lyons, 1668*
Scholarly work of the French Jesuit on the magnet. Unable to explain declination, p. 201; armed magnets, p. 274; effect of magnets on iron, p. 296; magnetic clock, p. 393.
162. Palladius. (368-430.) *Palladius de gentibus Indiae et Bragmanibus Graece et Latine*. S. Ambrosius de moribus Brachmanorum. Anonymus de Bragmanibus. Quorum priorem et postremum nunc primum in lucem protulit ex bibliotheca regia Edoardus Bissaeus. 23 l.+103 pp. 4to. Londini, excudebat T. Roycroft. *London, 1668*
The lodestone attracts the nails of ships; nails replaced by wooden pegs in vessels sailing for Tapiobane. Palladius was successively Bishop of Helenopolis and of Aspona in Galatia. See pp. 4 and 59.
163. Boyle, Robert. (1627-1691.) *Defensio doctrinae de elatere et gravitate aeris propositae a Robert Boyle, in novis ipsius physico-mechanicis experimentis adversus objectiones*. Francisci Lini ubi etiam objectoris funicularis hypothesis examinatur, eaque occasione nova quaedam experimenta adduntur, ab autore supradictorum experimentorum. 15 l.+176 pp.+5 l. 1 plate. 16mo. Roterdami, ex officina Arnoldi Leers. *Rotterdam, 1669*
Defense of the author's views on the properties of air, especially its weight and elasticity.
- 164.—*Nova experimenta physico-mechanica de vi aeris elastica et ejusdem effectibus, facta maximam partem in nova machina pneumatica ad (nepotem suum) D. Carolum literis pridem transmissa, ex Anglico in Latinam noviter conversa*. 12 l.+351 pp.+4 l., 1 plate. 16mo. Roterdami, ex officina Arnoldi Leers. *Rotterdam, 1669*
Magnet in vacuo, p. 85; magnetic effluvia, p. 101.

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- 165— —Paradoxa hydrostatica novis experimentis evicta. Nuper ex anglico sermone in latinum versa. 23 l.+240 pp., 3 plates. 16mo. Roterdami, ex officina Arnoldi Leers. *Rotterdam, 1670*
Phenomena and laws of hydrostatics discussed. English edition, 1666.
—See also 146.
166. **Lana, Francesco;** (Lana-Terzi); (Tertius de Lanis). (1631-1687.) Prodromo ouero saggio di alcune inuentioni noue premesso all'Arte Maestra Opera che prepara il P. Francesco Lana Bresciano della Compagnia di Giesu: Per mostrare li piu reconditi principij della Naturale Filosofia, riconosciuti con accurata Theorica, nelle piu segnalate inuentioni, ed isperienze sin'hora ritrouate da gli scrittori di questa materia et altre noue dell'autore medesimo. 4 l.+252 pp., 20 plates. Folio. Brescia, per li Rizzardi. *Brescia, 1670*
Signaling by means of lights and flags, p. 44; method of weighing air, p. 52; balloons, p. 57; thermometer invented by author, p. 64; hygrometer, p. 68; telescope, p. 169; *microscope*, p. 214; air-ships and other inventions illustrated. The author, an Italian Jesuit, was Professor of Natural Philosophy in Brescia, his native city.
—See also 197, 321.
- 167 **Boyle, Robert.** (1627-1691.) Tractatus de cosmicis rerum qualitibus, cosmicis suspicionibus, temperie subterraneorum regionum, temperie submarinarum regionum, fundo maris, quibus praemittitur introductio ad historiam qualitatum particularium, Accessit denique tractatus de absoluta quiete in corporibus. Omnia ex anglica in latinam linguam conversa. 7 parts. 6 l.+60+40+42+64+30+24 pp.+2 l.+57 pp.+1 l. 16mo. Amstelodami, apud Johannem Janssonium. *Amsterdam, 1671*
The first tract treats of the cosmic qualities of bodies; the second, the temperature of subterranean and submarine regions.
- 168.— —Tractatus scripti a Roberto Boyle; ubi, I. Mira aeris (etiam citra calorem) rarefactio detecta. II. Observata nova circa durationem virtutis elasticae aeris expansi. III. Experimenta nova de condensatione aeris solo frigore facta, ejusque compressione sine machinis. IV. Ejusdem quantitatis aeris rarefacti et compressi miri discrepans extensio. 71 pp., 16mo. Londini, impensis Henrici Herringman. *London, 1671*
Rarefaction and compression of air, with original experiments.
—See also 146.
169. **Kircher, Athanasius.** (1601-1680.) Ars magna lucis et umbrae, in X libros digesta. Quibus admirandae lucis et umbrae in mundo, atque adeo universa natura, vires effectusque uti nova, ita varia novorum reconditorumque speciminum exhibitione, ad varios mortalium usus penduntur. Editio altera priori multo auctior. 810 pp., ill., 34 plates. Folio. Amstelodami, apud Joannem Janssonium. *Amsterdam, 1671*
Comprehensive work on horography, astronomy and conics; reference to magnetic phenomena, p. 693. There is an error of 100 pp. in the pagination.
First edition, 1643.
—See also 102.

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170. **Guericke**, Otto von. (1602-1686.) *Experimenta nova Magdeburgica de vacuo spatio primum a G. Schotto, nunc vero ab ipso auctore perfectius edita, variisque aliis experimenta aucta, quibus accesserunt simul certa quaedam de aeris pondere circa terram de virtutibus mundanis et systemate mundi planetario.* 8 l.+244 pp.+2 l., ill., 2 plates, portr. Folio. Amstelodami, apud Joannem Janssonium. *Amsterdam, 1672*
Copies of this first edition are now very rare. This remarkable work on experimental philosophy ranks next to Gilbert's in the number and importance of the electrical discoveries described. Electric conduction and repulsion, the discharging power of points, the dissipation of charge by flames, the light due to electrification, the crepitating noises of small sparks are all recognized, pp. 147-150. The globe of sulphur, first of frictional machines, p. 148. Folio plate showing the Magdeburg experiment; also other noteworthy illustrations. (See No. 142.)
171. **Rohault**, Jacques. (1620-1675.) *Traité de physique.* 2 vols. 15 plates. 16mo. Amsterdam, Jacques le jeune. *Amsterdam, 1672*
Standard work of the time on physics, first edition, 1671. Chapter viii., Part iii., p. 254, treats of the magnet; the magnetic condition of crosses on church-spires, p. 281; declination in Paris, p. 296; effects of air, rust, heat, p. 299; amber and jet, p. 302; lines of force due to rubbed amber, p. 303; lightning and thunder, p. 363; the ringing of bells during electric storms, p. 371. A Latin translation with notes, made by Dr. Samuel Clarke, was used in the University of Cambridge prior to the publication of Newton's *Principia* in 1687.
- 171a.—(Latin translation.) *Tractatus physicus Gallice emissus et recens Latinitate donatus per Th. Bonetum, D. M. cum animadversionibus Antonii Le Grand.* 2 vols., pl., 8vo. Londini, G. Wells. *London, 1682*
Translation from the French edition of 1672. Part iii. contains a chapter on the magnet, p. 141; lines of force, p. 156; declination at Paris, p. 161; amber and jet, p. 165; lightning and thunder, p. 196.
—See also 260.
172. **Boyle**, Robert. (1627-1691.) *Essays of the strange subtilty, determinate nature, great efficacy of effluvioms, to which are annexed new experiments to make fire and flame ponderable, together with a discovery of the perviousness of glass.* 4 l.+69 pp.+1 l.+74 pp.+5 l.+85 pp.+3 l. 8vo. London, for M. Pitt. *London, 1673*
The first essay treats of the lodestone and its effluviom; the second, of electricity as a material emanation.
—See also 146.
173. **Pfundt**, Ehrenfried. (— — —.) *Disputatio physica de magnete.* 14 l. Sm. 4to. Leucopetrae, F. Bruehl. *Weissenfels, (1673)*
Historical essay on the magnet. Some views of Kircher and Schott discussed.
174. **Boyle**, Robert. (1627-1691.) *New experiments about the preservation of bodies in Vacuo Boyliano.* 1 l.+17 pp. 12mo. London, M. Pitt. *London, 1674*
Beer soured by thunder, p. 10; not so when in vacuo, p. 11.



OTTO de GUERICKE

Sereniss: et Potentiss: Elector: Brandeb:
Consiliarius et Civitat: Magdeb: Consul:

170. GUERICKE. (Reduced.)

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175.—Observations about the growth of metals in their ore exposed to the air. 25 pp. 12mo. London, M. Pitt. *London, 1674*
The observations refer to lead, iron, silver, gold.

176.—Tracts: i. Suspicions about some hidden qualities of the air, 71 pp.; ii. Observations about the growth of metals in their ore exposed to the air, 25 pp.; iii. Some additional experiments relating to the suspicion about the hidden qualities of the air, 13 pp.; iv. Animadversions upon Mr. Hobbes' problemata de vacuo, 8+94 pp.; v. Of the cause of attraction by suction, a paradox, 3+67 pp.; vi. New experiments about the preservation of bodies in Vacuo Boyliano, 17 pp. 12mo. London, M. Pitt. *London, 1674*

Remarks on exposing a magnet to the air by day, by night and at different seasons of the year.

—See also 146.

177. Oughtred, William. (1573-1661.) Description and use of the double horizontal dial, whereby not only the hour of the day is shewne but also the meridian line is found; whereunto is added the description of the general horological ring invented by W. O. London, for W. Leake. *London, 1674*

Work on horology by the English divine and mathematician.

178. Boyle, Robert. (1627-1691.) Experiments, notes, etc., about the mechanical origine or production of divers particular qualities: among which is inserted a discourse of the imperfection of the chymist's doctrine of qualities; together with some reflections upon the hypothesis of alcali and acidum. (Twelve tracts, as below.) 8vo. London. E. Flescher.

London, 1675

1.—Experiments and notes about the mechanical origine or production of divers particular qualities; together with some reflections upon the hypothesis of alcali and acidum. 1. 1.+23 pp. 2.—Of the mechanical origine of heat and cold. 1 1.+105 pp. 3.—Experiments and observations about the mechanical production of tastes. 35 pp. 4.—Experiments and observations about the mechanical production of odours. 31 pp. 5.—Of the imperfection of the chymist's doctrine of qualities. 50 pp. 6.—Reflections upon the hypothesis of alcali and acidum. 38 pp. 7.—Experiments and notes about the mechanical origine and production of volatility. 7 1.+56. pp. 8.—Experimental notes of the mechanical origine or production of fixtness. 34 pp. 9.—Experiments and notes about the mechanical origine or production of corrosiveness and corrosibility. 1 1.+69 pp. 10.—Of the mechanical causes of chymical precipitation. 3 1.+46 pp. 11.—Experiments and notes about the mechanical production of magnetism. 2 1.+20 pp. 12.—Experiments and notes about the mechanical origine or production of electricity. 1 1.+38 pp.

178a.—Two tracts on electricity and magnetism, reprinted from the rare editions of 1675 and 1676. With a preface by S(ilvanus) P. T(hompson). 84 pp. 16mo. *London, 1898*

The preface of thirteen pages to these two important reprints is by Professor

Experiments and Notes
ABOUT THE
MECHANICAL ORIGINE
OR
PRODUCTION
OF
Electricity.

By the Honourable
ROBERT BOYLE Esq;
Fellow of the *R. Society*.

L O N D O N,
Printed by *E. Fleisher*, for *R. Davis*
Bookseller in *Oxford*. 1675.

178. BOYLE.

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Silvanus P. Thompson, who remarks, p. 8, that the tract entitled *Of Electricity* is of great interest as being the first book on the subject of electricity published in England after Gilbert's *De Magnete*. The tracts are 11 and 12 of No. 178. (See No. 188.)

—See also 146.

179. **Bond, Henry.** (— — —.) *Longitude found, or a treatise shewing an easie and speedy way, as well by night as by day, to find the longitude, having but the latitude of the place, and the inclination of the magnetical inclinatorie needle.* 7 l.+65 pp.+1 l. 7 plates. 4to. London, Henry Bond.
London, 1676

Observations made by Borough, Gunter, Gellibrand and the author himself from which the secular change in magnetic declination is deduced; Bond introduced the word *inclination* to denote magnetic dip. This work was the subject of criticism by Hobbes, q.v. (See No. 185.) Bond was an instructor in navigation in London.

180. **Heidel, Wolfgang Ernest.** (— — —) *Johannis Trithemii Steganographia quae hucusq; a nemine intellecta, sed passim ut supposita pernicioſa, magica et necromantica vindicata, reserata et illustrata a Wolfg. E. Heidel.* 4 l.+394 pp.+2 l. 4to. Moguntiae, Zubrot.
Mayence, 1676

Part i. contains an account of the life of Trithem, a celebrated German writer and Benedictine monk who died in 1516; also vindication of steganography or secret writing. Sympathetic compasses, p. 358.

- 181*. **Kirchmayer, Georg Caspar.** (Also Kirchmaier.) (1635-1700.) *Noctiluca constans et per vices fulgurans diutissima quæſita, nunc reperta; dissertatione brevi prævia de luce, igne, ac perennibus lucernis.* 12 l. 4to. Wittebergæ, M. Henckel.
Wittenberg, 1676

Distinction between fire and light, p. 4; "fulminating" gold, p. 5; asbestos, p. 6; the diamond, p. 7.

—See also 189.

182. **Sturm, Johann Christoph.** (1635-1703.) *Collegium experimentale, sive curiosum in quo primaria hujus sæculi Inventæ et Experimenta physico-mathematica, speciatim Campanæ vrinatoriae, Camerae obscuræ, Tubi Torricelliani, seu Baroscopii, Antliæ Pneumaticæ, Thermometrorum, Hygroskopiorum, Microscopiorum, etc. Phaenomena et Effecta spectanda oculis subjecit; cum epistola ad Henricum Morum Cantabr. de Spiritu ipsius Hylarchico, etc.* 2 vols., ill. pl. 4to. Norimbergæ, sumptibus Wolfgangi Mauritii Endteri.

Nuremberg, 1676-1685

Collection of experiments in hydrostatics, pneumatics and optics. Magnetic experiments, p. 230; magnetic field, p. 234.

—See also 199.

183. **Dechaſes, Claude François Milliet.** (also Chales.) (1621-1678.) *L'art de naviguer démontré par principes et confirmé par*

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plusieurs observations tirées de l'expérience. 10 l.+274+46 pp.+4 l. 4to. Paris, Estienne Michallet. Paris, 1677

The preface contains list of works on the magnet arranged in *chronological* order; use of compass described at length, p. 88; magnetic declination in London and Paris, p. 100; latitude from magnetic dip, p. 217. The author was member of the Society of Jesus.

184. Schott, Gaspar. (1608-1666.) *Magia universalis naturae et artis, sive Recondita Naturalium et Artificialium rerum Scientia, cujus Ope per variam Applicationem activorum cum passivis, admirandorum effectuum Spectacula, abditarumque inventionum Miracula ad varios humanae vitae usus eruuntur. Opus quadripartitum. Pars i. continet Optica. ii. Acoustica. iii. Mathematica. iv. Physica. Singularum Epitomen sequens Praefatio obiter, accuratius vero uniuscujusq. peculiare praeloquium exponit. Cum figuris aeri incisis.* 4 vols. pl. 4to. Bambergae, sumptibus Joh. Martini Schoenwetteri.

Bamberg, 1677

The author discusses the sympathetic magnetic telegraph, Vol. iv, p. 49, and perpetual motion by means of magnets, p. 313, *et seq.* A manuscript translation of the part which treats of magnetic and sympathetic cryptography will be found at the end of the volume. Book iii., pp. 296-348, treats of the magnet and magnetic devices. The influence of the author's instructor, Kircher, is felt throughout. Von Guericke's Magdeburg experiments are referred to; Vol. iii., p. 554. (See No. 170.)

—See also 142.

185. Hobbes, Thomas. (1588-1679.) *Decameron Physiologicum; or Ten Dialogues of Natural Philosophy to which is added The Proportion of a straight line to half the arc of a quadrant.* 4 l.+136 pp.+4 l., 1 pl. 12mo. London, for W. Crook.

London, 1678

The author is the famous English philosopher and historian. Chapter ix. is a critique of Bond's *Longitude Found*. (See No. 179.) Speculation on the nature of magnetic attraction, p. 105.

186. Schiele, Johann Georg. (— - — .) *Bibliotheca Enucleata; seu Artefodina artium ac scientiarum omnium exhibens apographa, elenchos, et pericopes in jurisprudentia, physica, etc., in alphabeti seriem digesta.* 9 l.+624 pp. pl. 4to. Ulmae, sumptibus auctoris.

Ulm, 1679

Book of reference giving under each article the names of works in which information will be found. Acus magnetica (the magnetic needle), p. 16; and Magnes (the magnet), p. 399.

187. Boyle, Robert. (1627-1691.) *Opera varia.* 3 vols. pl. portr. 4to. Genevae, apud Samuelem de Tournes. Geneva, 1680-1693

Vol. i., Experimentum xvi.; tract entitled "Nova Experimenta Physica-Mechanica;" Magnetic effluvium, p. 45; also p. 47 of "Tentamina Physiologica." Vol. ii. Electrical effluvium, cap. iv. "De insigni efficacia effluviurum."

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- 188.—Works epitomized by Richard Boulton. 4 vols., portr., pl. 8vo. London, for E. Phillips. *London, 1699-1700*

Vol. ii., p. 323 contains the author's famous tract *On the Mechanical Origin and Production of Electricity*, being the earliest work on electricity written in English, first edition 1675. (See 178.) Also, p. 315, the author's memorable tract *On the Mechanical Production of Magnetism*, published in 1676. (See 178.) Reversal of the polarity of a ship's compass, the stem of the ship being struck by lightning, p. 355. Lodestone in exhausted receiver, Vol. i., p. 481; bar of iron held vertically near compass, p. 202.

- 188*a.—Works, to which is prefixed the life of the author. (Edited by Thomas Birch, F. R. S.) 5 vols., portr., Folio. London, for A. Millar. *London, 1744*

The life of Boyle is by Dr. Thomas Birch, F.R.S.; it comprises 94 pages and contains two letters by Newton on the ether of space. Most important are the tracts on the "*Spring of Air*" and the "*Mechanical Production of Magnetism and Electricity*." Magnetism developed in a "*red-hot brick*" while cooling in the magnetic meridian, Vol. v., p. 81. First use of the term *barometer*, Vol. ii., p. 546.

—See also 146.

189. Kirchmayer, Georg Gaspar. (Also Kirchmaier.) (1635-1700.) De phosphoro et natura lucis, nec non de igne commentatio epistolica. 1 l.+72 pp.+3 l. Sm. 4to. Wittebergae, J. H. Ellinger. *Wittenberg, 1680*

On p. 70, reference to magnetic declination in London, Paris, Amsterdam and Hamburg. Refers to luminosity of fluor spar.

—See also 181.

190. Schott, Gaspar. (1608-1666.) Schola steganographica, in classes octo distributa, Quibus, praeter alia multa, ac jucundissima explicantur Artificia nova, Queis quilibet, scribendo, Epistolam qualibet de re, et quocunque idiomate potest alteri absenti, eorundem Artificiorum conscio, arcanum animi sui conceptum, sine ulla secreti latentis suspicione manifestare; et scriptam ab aliis eadem arte, quacunque lingua, intelligere, et interpretari. 16 l.+346 pp.+7 l., pl., tab. 4to. Norimbergae, sumptibus Johannis Andreae Endteri. *Nuremberg, 1680*

Systems of secret writing. Magnetic signaling by means of a pair of compasses, p. 258. *Daniel Schwenter* is referred to, p. 259, under his assumed name of *Janus Hercules de Sunde*. (See No. 73.) First edition, 1665.

—See also 142.

191. Kuhlmann, Quirinus. (1652-1689.) Kircheriana de Arte magna Sciendi sive Combinatoria, admirabilibus quibusdam Inventis, Sapientia Infusa, Adamea Salomoneaque, post septennalem publicationem, orbe Europeo frustra ringente, consummatus emissa ad Ludovicum XIV. Regem Liligerum. 48 pp. 8vo. Londini, imprimuntur a Johan. Gain pro Authore, ac prostant apud Guilelmum Cooper. *London, 1681*

Letters on scientific subjects written to Kircher by the author. (See No. 102.)

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192. **Senguerdius, Wolferdus.** (1646-1724.) *Philosophia naturalis quatuor partibus primarias corporum species, affectiones, vicissitudines et differentias exhibens.* 4 l.+302 pp.+13 l., ill. Sm. 4to. Lugduni Batavorum, apud Danielelem a Gaesbeeck. *Leyden, 1681*
Chapter on the magnet, p. 254.
193. **Hiller, Ludwig Heinrich.** (— — — .) *Mysterium artis steganographicae novissimum, modum omnes epistolas, aliaque scripta incognita Characteribus furtivis exarata, in omnibus linguis, praesertim Latina, Germanica, Gallica, Italica expeditè solvendi pandens.* 11 l.+478 pp.+4 l. 12mo. Ulmae, sumptibus Georgii Wilhelmi Kuehnen. *Ulm, 1682*
The art of secret writing. In the preface, Daniel Schwenter's work on steganography is referred to. On p. 278, *Janus Hercules de Sunde* is given as Schwenter's assumed name. (See No. 73.)
- 194*. **Galtruche, Pierre.** (Also Gautruche.) (1602-1681.) *Mathematicae totius, hoc est arithmeticae, geometriae clara, brevis et accurata institutio.* 5 l.+305 pp.+2 l. 20 plates. 12mo. Londini, impensis Richardi Green. *London, 1683*
Elementary work on mathematics and cosmography; the argument is that because the earth is a magnet, it neither turns on its axis nor revolves around the sun, p. 222; terrestrial magnetism, p. 227. The author was member of the Society of Jesus.
- 195*. **Kast, Johann Joachim.** (— — — .) *Questionum decades duae De magnete.* 1 l.+26 pp.+2 l. 4to. Argentorati, Staedel. *Strasburg, 1683*
Discussion of twenty questions about the magnet. Nature of magnetic attraction, p. 5; the earth as a magnet, p. 3; effect of arming a magnet, p. 23.
196. **Accademia del Cimento.** *Essayes of natural experiments made in the Accademia del Cimento under the protection of the most serene Prince Leopold of Tuscany, written in Italian by the secretary of that academy. Englished by Richard Waller.* 12 l.+160 pp.+6 l. 19 plates. 4to. London, for Benjamin Alsop. *London, 1684*
This collection contains papers describing experiments on light, sound and electricity. Amber rubbed in vacuo, p. 43; magnetic attraction across a vacuum, p. 53; magnetic screening, p. 124; rubbed amber and gems, p. 128; discharging action of flames, p. 129; electrical attraction is mutual, p. 130.
197. **De Lanis, Franciscus Tertius, (Lana-Terzi).** (1631-1687.) *Magisterium naturae et artis, opus physico-mathematicum, in quo occultiora naturalis philosophiae principia manifestantur, et multiplici tum experimentorum, tum demonstrationum, serie comprobantur; ac demum tam antiqua pene omnia artis inventa, quam multa nova ab ipso autvore excogitata in lucem proferuntur.* 3 vols. 57 plates. Folio. Brixiae, per Jo. Mariam Ricciardum. *Brescia, 1684-1696*
Book xxii. of this encyclopaedia in three finely printed folio volumes,

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treats at great length of motion due to electric attraction and repulsion; Book xxiii., the same for magnetic attraction; magnetic clocks, p. 409; sympathetic compasses, p. 412; the compass and the dipping needle, Book xxiii., p. 227.

—See also 166.

198. **Friderici, Johannes Balthasar.** (— - — .) *Cryptographia; oder, Geheime schrift muend-und wuerckliche Correspondentz welche lehrmaessig vorstellet eine hoch-schaetzbare Kunst verborgene Schrifften zu machen und auffzuloesen.* 3 l.+880 pp. pl. 4to. Hamburg, G. Rebenlein. *Hamburg, 1685*
Treatise on cryptography; code resembling that of Morse, p. 234; signaling by lights, p. 252; and by flags, p. 255.
199. **Sturm, Johann Christoph.** (1635-1703.) *Ad virum celeberrimum Henricum Morum Cantabrigiensem epistola, qua de ipsius principio hylarchico seu spiritu naturae et familiari modernis hydrostaticis aeris gravitatione et elatere.* 116 pp.+3 l. ill. 4to. Norimbergae, sumptibus Wolfgangi Mauritiï Endteri. *Nuremberg, 1685*
Pressure and flow of liquids, weight and elastic force of air.
—See also 182.
200. **D(alancé, Joachim).** (— - — .) *Traité de l'aiman, divisé en deux parties. La première contient les expériences et la seconde les raisons que l'on en peut rendre par M. D * * ** 11 l.+140 pp.+4 l. 49 plates. Sm. 4to. Amsterdam, Henry Wetstein. *Amsterdam, 1687*
General treatise (rare) on the magnet and its uses. Invention of the compass, p. 8; magnetic mountains of America, p. 12; declination, p. 45; disproof of magnetic suspension of Mahomet's coffin, p. 59; fallacy of magnetic unguents, p. 56; orientation of compass-needle in a magnetic field. The illustrations are quaint and suggestive, especially the one on the title-page.
- 200a.— —Another edition. 3 l.+45 pp. 34 plates. Sm. 4to. Liège. *Liège, 1691*
The illustrations of magnetic phenomena are on a larger scale than in the first edition.
201. **Boulenger, Jean.** (— - — .) *Traité de la sphère du monde.* 320 pp., map & ill. 8vo. Paris, Jean Jombert. *Paris, 1688*
Extensive treatise on astronomy.
- 202*. **Orpheus.** (— - — .) *Argonautica, hymni et de lapidibus curante A. Chr. Eschenbachio cum ejusdem ad argonautica notis et emendationibus accedunt Henrici Stephani in omnia et Josephi Scaligeri in hymnos notae. Graece et Latine.* 329 pp. 12mo. Trajecti ad Rhenum, apud Guilelmum van de Water. *Utrecht, 1689*
These argonautic poems are given in Greek and in Latin; magnetic references, pp. 209, 217, 241. Andreas Christian Eschenbach of Nuremberg, the editor of these Orphic poems was a distinguished Greek scholar, 1663-1705.

TRAITTE
DE
L'AIMAN.

Divisé en deux parties.

La première contient les Expériences;
& la seconde les raisons que l'on en
peut rendre

Par M^r. D***



A AMSTERDAM,
Chez HENRY WETSTEIN, 1687.

200. DALANCÉ.

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203. Boyle, Robert. (1627-1691.) *Experimenta et observationes physicae*; wherein are briefly treated of several subjects relating to natural philosophy in an experimental way, to which is added a small collection of strange reports, in two parts. 5 l.+158 pp.+28 pp.+1 l. 12mo. London, for John Taylor. *London, 1691*

In the first 25 pages experiments are described in which lodestones are ignited, i.e. raised to a high temperature.

—See also 146.

204. Broun, Robert. (Scotus). (— — —) *Disputatio de fulmine*. Praeses G. de Vries. (Dissertatio.) 8 l. 4to. Trajecti ad Rhenum. *Utrecht, 1692*

Thunder-clouds, x.; effects of lightning, xi.; fig-tree and laurel-tree never struck, xi.

205. Vallemont, Pierre de (Abbé Le Lorrain de Vallemont.) (1649-1721.) *Description de l'aimant qui s'est formé a la pointe du clocher neuf de N. Dame de Chartres avec plusieurs expériences très curieuses, sur l'aimant et sur d'autres matières de physique*. 6 l.+215 pp. 12mo. Paris, Laurent d' Houry. *Paris, 1692*

Though entitled a discussion of the magnetic character of a piece of iron that belonged to the steeple of Notre Dame de Chartres, which was destroyed by a storm in 1690, this work is an important treatise on magnets and magnetic theory. Magnetic forces and corpuscles, p. 35; Descartes' whirling screw-like particles, p. 48; illustration of magnetic field due to the earth; iron-posts and fire-irons magnetized, p. 52; compass useless in high latitudes, p. 59; declination in London and Paris, p. 110; secular variation of declination, p. 111; invention of the compass, p. 100; magnetic signaling through a wall, p. 185; use of compass in traveling, p. 199; keeper strengthens the magnet, p. 203.

- 206.— *La physique occulte, ou, Traité de la baguette divinatoire et son utilité pour la découverte des sources d'eau, des minières, des trésors cachés, des voleurs et des meurtriers fugitifs, avec des principes qui expliquent les phénomènes les plus obscurs de la nature*. 15 l.+609 pp. ill. 12mo. Paris, Jean Anisson. *Paris, 1693*

Treatise on the *Divining Rod*. Amber and jet, p. 82; magnetic dip at Paris, p. 130; description of dip-circle, p. 130; whirl of magnetic matter, p. 132; illustration of dip, p. 128; the American torpedo, p. 318; magnetic corpuscles more subtle than rays of light, p. 320.

- 206a.— Another edition. 8 l.+422 pp. pl. 16mo. Paris, Jean Boudot. *Paris, 1696*

This edition has an appendix which gives on p. 32 an account of the sympathetic telegraph.

—See also 214.

207. Leybourn, William. (1626-1700 (?)). *Pleasure with profit; consisting of recreations of divers kinds, viz., numerical, geometrical, mechanical, statical, astronomical, magnetical and historical, published to recreate ingenious spirits, and to*

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induce them to make farther scrutiny in these sciences. To this work is also annext a treatise of algebra, by R. Sault. 12 parts. 6 l.+56+86+31+24+63+28+13+9+9+11+26 pp.+ 2 l.+52 pp. ill. pl. Folio. London, for Richard Baldwin.

London, 1694

Work of recreative experiments.

—See also 209.

208. **Reeland**, Hadrian. (Also Reland.) (1676-1718.) *De libertate philosophandi*. 18 pp. 4to. Trajecti ad Rhenum. (Inaugural dissertation.) *Utrecht, 1694*

Academical thesis in favor of liberty in philosophical speculation.

209. **Sault**, Richard. (? -1702.) *A new treatise of algebra, apply'd to numeral questions and geometry*. 2 l.+52 pp. Folio. London for Richard Baldwin. *London, (1694)*

Work of some historical interest to the mathematical reader.

—See also 207.

210. **Smith**, John. (— — —.) *Horological disquisitions concerning the nature of time and the reasons why all days, from noon to noon are not alike twenty-four hours long; to which is added rules for the ordering and use both of the quicksilver and spirit weather-glasses, and Mr. S. Watson's rules for adjusting a clock by the fixed stars*. 2 l.+92 pp. tab. 12mo. London, for Cumberland. *London, 1694*

Regulation of the pendulum for time-keeping purposes; one of the early works on the subject.

211. **Sorbière**, Samuel de. (1615-1670.) *Sorberiana, ou, Bons mots, rencontres agréables, pensées judicieuses et observations curieuses*. (Mémoires pour la vie de S. Sorbière et J. B. Cotelier, dans une lettre écrite par M. Graverol. *Epulae Ferales sive fragmenti Marmoris Nemantini enodatio*. (by Graverol. Edited by G. L. Colomyez.) 24 l.+246 pp. 16mo. Paris, Cramoisy. *Paris, 1694*

Criticism on Cardan, p. 69, on Descartes, p. 76, on Galileo, p. 100, and on Porta, p. 169.

212. **Hale**, (Sir) Matthew. (1609-1676.) *Magnetismus magnus; or, Metaphysical and divine contemplations on the magnet, or, loadstone*. 4 l.+159 pp. 12mo. London, for William Shrowsbury. *London, 1695*

Religious and moral treatise by the celebrated English jurist. The discovery of the compass and its introduction into Europe, p. 48; molecular magnets, p. 55. "That every smallest particle of this magnet, every little dust thereof should have the very same conformation that the entire magnet had," p. 55.

213. **Harrison**, Edward. (— — —.) *Idea longitudinis; being a brief definition of the best known axioms for finding the longitude; or, A more rational discovery thereof, than hath been heretofore published*. 8 l.+83 pp. 12mo. London, for Harrison. *London, 1696*

Four magnetic poles, p. 27; "Variation of Variation," p. 27; longitude

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cannot be found from the magnetic declination of a place, p. 27; annual variation, p. 28; no declination near the Azores, p. 39; Strada's poem, p. 46. (See No. 90.) Royal Society's lodestone, p. 47.

214. (Vallemont, Pierre.) (Abbé Le Lorrain de Vallemont.) (1649-1721.) *Traité de la connoissance des causes magnétiques des cures sympathiques des transplantations et comment agissent les philtres. Par un curieux de la nature.* 34 pp.+4 l. 12mo. (Amsterdam.) *Amsterdam, 1696*

Magnetic signaling, p. 32; the rest of the booklet treats of sympathy, antipathy and philtres.

—See also 205.

215. Velsen, Bartholomaeus van. (— - — .) *De honesto.* 14 pp. 4to. *Trajecti ad Rhenum.* (Inaugural dissertation.)

Utrecht, 1696

Metaphysical dissertation on "Honesty."

216. Zahn, Johann. (1641-1707.) *Specula physico-mathematico-historica notabilium ac mirabilium sciendorum.* 3 vols. pl. tab Folio. Norimbergae, sumptibus Joannis Christophori Lochner.

Nuremberg, 1696

List of writers on the magnet with appreciation of their work, Part ii., p. 68; armed lodestone, p. 69; healing influence of lodestone, p. 69; gagates and jet have medicinal properties, Part ii., p. 53. Zahn was a priest, member of the Premonstratensian order.

217. (Wallis, John.) (1616-1703.) A brief letter from a young Oxonian to one of his late fellow-pupils upon the subject of magnetism. 1 l.+14pp. 12mo. London, for S. Keble. *London, 1697*

It is thought that this letter was written by the celebrated Dr. Wallis, Savilian Professor of Geometry at Oxford. See *London Electrical Review*, Jan. 30, 1891. P. 10 contains a "draught" illustrating the arrangement of magnetic lines of force.

—See also 2448.

218. Zwinger, Theodor, (the younger). (1658-1724.) *Scrutinium magnetis physico-medicum, quo mirifici illius lapidis natura viresque e principiis mechanicis explicantur.* 4 l.+214 pp.+1 l. 12mo. Basileae, ex officina Joh. Philippi Richteri.

Basle, 1697

Comprehensive treatise on the magnet. Inventor of the compass, p. 45; declination observed by Cabot and Oviedo, pp. 46, 68, 158; dip by Norman, p. 46; magnetic lines of the earth defined, p. 50; action of nitric acid in weakening a magnet, p. 175; magnet with four poles, p. 175; medical uses of the magnet, p. 185.

219. Bartholinus, Caspar Thomas. (1655-1738.) *Specimen philosophiae naturalis praecipua physices capita exponens. Accedit de fontium fluviorumque origine ex pluviis, dissertatio physica.* 7 l.+175 pp.+2 l.+26 pp. 12mo. Oxoniae, impensis Henr. Clements.

Oxford, 1698

Properties of the magnet, p. 80; magnetic impulsion is not attraction, p. 81; Cartesian views of magnetic matter, p. 83.

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- 219a.— —Another edition. 6 l.+164 pp.+2 l.+23 pp. 16mo. Oxoniae,
Henr. Clements. *Oxford, 1703*
220. (Puget, Louis de.) (1629-1709.) Lettres écrites à un philosophe
sur le choix d'une hypothèse propre à expliquer les effets de
l'aiman. 1 l.+138 pp. 12mo. *(Lyons, 1699)*
Defense of the Cartesian doctrine of the earth's magnetism against twenty-
three objections.
221. Blom, Leonard. (— — —.) De anno seculari 1700. 10 pp. 4to.
Trajecti ad Rhenum. (Exercitatio Philosophica.) *Utrecht, 1700*
Remarks on the beginning of century-years.
222. Cesi, Innocenzo. (1652-1704.) De meteoris dissertatio. 6 l.+
89 pp. 12mo. Mantuae, A. Pazzo. *Mantua, 1700*
Work on general meteorology showing how to produce many curious
natural phenomena; lightning and thunder, p. 37.
- 223.— —De qualitativibus dissertatio. 5 l.+204 pp. 12mo. Mantuae,
A. Pazzo. *Mantua, 1700*
Electric attraction due to thread-like particles and magnetic effluvia, p. 157;
discharging power of flames, p. 152; the earth's magnetism, pp. 157, 164,
172; how a magnet may be weakened, p. 178; its strength preserved, p. 180.
- 224*. Martius, Johannes Nicolaus. (— — —.) Dissertatio inauguralis
physico-medica, De magia naturali, ejusque usu medico ad
magice et magica curandum. 44 pp. 4to. Erfordiae, excudebat
J. H. Grosch. *Erfurt, 1700*
Thesis submitted for the degree of Licentiate in Medicine. Various kinds
of natural magic, p. 12; the siphon, p. 17; uses of the magnet in medicine,
pp. 28, 31, 36.
225. Le Brun, P(ierre). (1661-1729.) Histoire critique des pratiques
superstitieuses, qui ont seduit les peuples et embarrassé les
sçavans. Avec la méthode et les principes pour discerner
les effets naturels d'avec ceux qui ne le sont pas, par un prêtre
de l'oratoire (i.e., Rev. Pierre Le Brun). 2 vols. 12mo.
Rouen, Behourt. *Rouen, 1701-1702*
Critical history of superstitious practices. This is a copy of the first edition.
Vol. i., p. 293, disbelief in magnetic communication between distant
persons.
- 226†. Bergerac, Savinien, Cyrano de (1629-1655.) Les oeuvres de
Monsieur de Cyrano de Bergerac. 2 vols. portr. 12mo.
Cologne. *Cologne, 1703*
Considerations on physics and cosmography. Vol. ii. contains the "Comic
History of the States and Empires of the Moon," which may have suggested to
Dean Swift the idea of *Gulliver's Travels*. This work, which passed
through many editions in the latter half of the Seventeenth Century, con-
tains numerous speculations on matters pertaining to the domain of science.
One of the many curious passages in the *Voyage to the Sun*, vol. ii., p. 227,
relates that when at a certain distance from that luminary, the human
body becomes transparent so that the bones and internal organs may be seen.
The author was of the swashbuckler type and is thus portrayed in Rostand's
play.

though it should be made *in vacuo*, where the Impediment of the *Medium* could make very little or no Alteration.

Having enumerated some of the most remarkable Proprieties of Gravity, we come in the next place to consider what may be the Cause thereof.

And first, I believe I shall not need to say much against the Opinion of *Intelligent Matter*, which supposes every part of Matter to act understandingly; for that being supposed, all Philosophy is vain, and there needs no farther Inquiry into Nature.

And secondly, I have as little to say to its *Cousin-german* Opinion, *viz.* the *Regimen of an Hylarchick Spirit*.

And 3ly, The *Epicurean* Atoms seem to me to give as little of Explanation almost as either of the former.

And 4ly, For the *Peripatetic* Doctrine of tendency to the Center of the Universe, besides that the Foundation is false, the Earth being proved not to be in the Center, 'tis not yet understood what the tendency is:

5ly, The *Cartesian* Doctrine, and that of Mr. *Hobbs*, are both insufficient, because they do not give any reason why Bodies should descend towards the Center under or near the Poles.

6ly, Nor will the *Magnetism* of *Gilbert* or *Kepler* serve; for, as I shall afterwards shew, that is a Propriety distinct from Gravity, and of quite another nature.

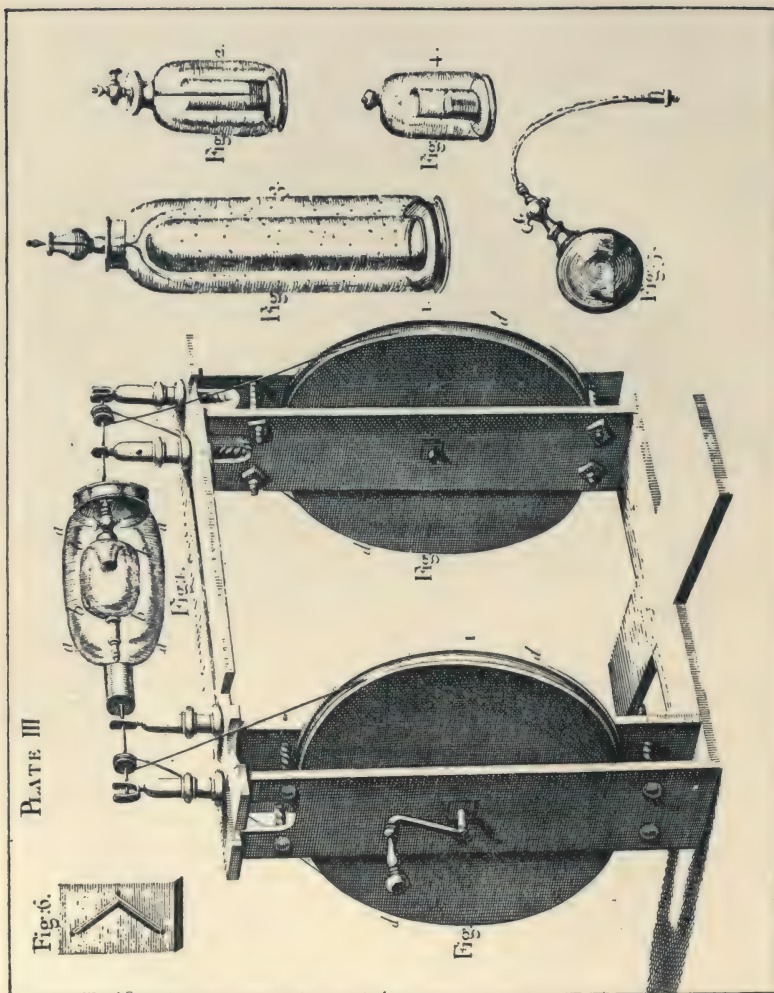
It must therefore be somewhat else differing from all these, which by reason of its acting by the means of some very insensible Body, it will be very hard to demonstrate, yet not altogether impossible. We find then that a Propriety somewhat like this is to be found in the Attraction of the Magnet and Iron. Another somewhat like it is to be found in Amber, Jet, Glafs, Chrystal, Diamonds, and several hard Bodies upon Rubbing: And more instructive yet to this Inquiry is the Experiment of Mr. *Newton*, of rubbing a Plate of Glafs, which is laid over some small bits of Paper, or other light Bodies, at some distance, by which Rubbing the Papers are made to rise up towards the Glafs, and stick fast to it. Now in all these Experiments there is a sensible Attraction of Grave Bodies to the respective attracting Bodies, or at least a Motion of those Bodies towards one another; though in all, the *Medium*, that causes this Endeavour of Motion, be insensible. Some have supposed for Amber, that the same being a very unctuous Body, certain stringy unctuous *Effluvia* are sent out, which sticking to the light Bodies, are drawn into the Amber again, and so bring back with them the light Bodies. But this is very hard to be supposed of Glafs or Chrystal, and least of all of a Diamond, which yet will have a considerable Electricity, as 'tis called, upon Rubbing. Besides, 'tis evident by Mr. *Newton's* Experiment, that the greatest Electricity of Glafs is at the very time when it is hardest rubbed, which should be the time when these unctuous Strings should be sent out; 'tis necessary therefore that some other Medium must be found than these unctuous and stringy Emanations.

If we farther consider of these Experiments, we shall find that there is in all these a necessity of an internal vibrative Motion of the Parts of the Electric Bodies; and that so soon as ever that Motion ceases, the Electricity also ceases: We may therefore conclude, that there may be such an internal Motion of the Parts of some Bodies, as may cause an Electrical Virtue in them, whereby they will be able to draw, with some small Degree of Power, some Bodies to them.

I have already here produced several Experiments, whereby I have shewn how mechanically to produce such an Attraction towards the acting Body. The first was that of a Body placed upon a wooden Rod, the one End of which was kept in its place by a Spring, and the other was struck by a Hammer, whereby it plainly appeared, that at every Stroke the Body was moved on the Rod towards the Hammer that struck. Here the *Aether* was resembled to a Solid. By the second Experiment, where a Ball poised in Water descended toward the striking Part, I shewed how the same Effect might be done by a fluid Medium, as in the other was done by a Solid. In the third was shewn how a Fluid also might

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227. **Hooke, Robert.** (1635-1702.) Posthumous works containing his Cutlerian lectures and other discourses read at the meetings of the Royal Society. Illustrated with sculptures. To these discourses is prefixt the author's life published by Richard Waller. 3 l.+xxviii.+572 pp.+6 l. 13 plates. Folio. London, Waller. *London, 1705*
On p. 183, the author holds that electrification is caused by vibratory motion and not by emissions of effluvia. The luminous radiation (electric light) observed in the dark when a diamond is briskly rubbed is attributed, p. 54, to the same molecular motion. A discourse on variation begins on p. 484. Lightning and thunder, p. 424.
—See also 262.
228. **Howard, Edward.** (— - — .) Copernicans of all sorts, convicted by proving, that the earth hath no diurnal or annual motion as is suppos'd by Copernicans, from the beginning of the world to this day: As also that their hypothesis is astronomically, philosophically, and sensibly false, to all impartial apprehensions. To which is annex'd a treatise of the magnet, as also how to find the annual variation of the compass. 4 l.+125 pp. 2 plates. Sm. 12mo. London, for Jeffery Wale. *London, 1705*
Tract on magnetic variation, beginning p. 76. Very rare.
229. **Purshall, Conyers.** (— - — .) An essay at the mechanism of the macrocosm: or, The dependence of effects upon their causes, in a new hypothesis. 8 l.+336 pp. 8vo. London, for Jeffery Wale. *London, 1705*
Continuous character of magnetic "streams," p. 267; they pass through gold, a man's body, or a vacuum, but are stopped by iron, p. 267; pores and magnetic particles, p. 270; "field" due to spherical magnet, p. 273; magnetization of iron bar while cooling in a vertical position, p. 275; sympathetic powder, p. 279.
230. **Borst, Jacobus van der.** (— - — .) De libertate mentis humane. 9 pp. 4to. Trajecti ad Rhenum. (Dissertatio Pneumatica.) *Utrecht, 1707*
Dissertation on the liberty of the human mind.
- 231*. **Andala, Ruard.** (1665-1727.) Exercitationes Academicæ in Philosophiam primam et naturalem; in quibus philosophia Renati Des-Cartes clare et perspicue explicatur confirmatur, necnon vindicatur. 8 l.+26+590 pp.+9 l. 3 plates. 4to. Franequerae, ex officina Wibii Bleck. *Franecker, 1709*
Twenty-four pages on the magnet: its history, polarity, orientation, and declination. Difference between electric and magnetic attraction, p. 570. The author was a follower of Gilbert; Descartes is named the "Architect of Experimental Philosophy."
232. **Hauksbee, F(rancis).** (? -1713.) Physico-mechanical experiments on various subjects, containing an account of several surprising phenomena touching light and electricity, producible on the attrition of bodies, together with the explana-



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tions of all the machines and other apparatus used in making experiments. 7 l.+194 pp. 7 plates. 4to. London, for the author.

London, 1709

Important contribution to the study of electric phenomena. This is a copy of the first edition, now very rare. Light due to friction of mercury against sides of exhausted glass-globe recognized as "flashes of lightning," p. 9; electric induction, p. 37; vacuous globe glows when rubbed externally, p. 41; violent repulsion, p. 42; crackling noise, pp. 52, 56; exhausted globe lit up when near a second one containing air and rubbed externally, p. 62. This work attracted much attention at the time and was translated into French and Italian.

- 232a.—Second edition. With a supplement containing several new experiments not in the former edition. 8 l.+336 pp. 8 plates. 8vo. London, for J. Senex.

London, 1719

- 232b.—(French translation.) *Expériences physico-mécaniques sur différents sujets, traduites de l'anglais par feu M. de Brémont. Revues et mises au jour, avec un discours préliminaire, des remarques et des notes par M. Desmarest.* 2 vols. 6 plates. 12mo. Paris, Veuve Cavelier.

Paris, 1754

233. **Reinzer, Franz.** (— — —.) *Meteorologia philosophico-politica in duodecim dissertationes per quaestiones meteorologicas et conclusiones politicas divisa, appositisque symbolis illustrata.* 5 l.+297 pp.+3 l. ill. pl. Folio. Augustae Vindelicorum, impensis Jeremiae Wolfii.

Augsburg, 1709

Work on general meteorology. Effects of lightning, p. 48; thunder-storm, p. 52; objects most and least liable to be struck, p. 53; amber and electric force, p. 257; armed magnet, p. 273; magnetic field mapped out by iron filings, p. 274; magnetism of the earth, p. 275. The engravings form a feature of the work.

234. **Henghel, Daniel van.** (— — —.) *De conjunctione mentis cum corpore humano.* 35 pp. 4to. Trajecti ad Rhenum. (Inaugural dissertation.)

Utrecht, 1710

On the union of the mind and body, a philosophical dissertation.

235. **Torfaeus, Thormodr.** (Thormodur Torfesen.) (1640-1719.) *Historia rerum Norvegicarum, in qua praeter Norvigae descriptionem, primordia gentis, instituta, mores, incrementa, etc., et quaecunque ad Regni Norvegici illustrationem spectant, luci publicae exponuntur.* (With a dedication by C. Reitzer.) 4 vols. Folio. Hafniae, ex typographeo Joachimi Schmitgenii.

Copenhagen, 1711

First edition of this celebrated history of Norway by the Icelandic historian. Reference to the use of the compass for navigation purposes in the year 1266, Part iv., p. 345. See also the article *magnetism* in the *Encyclopaedia Metropolitana*, p. 737. (See No. 2645.)

236. **Billingsley, Case.** (— — —.) *Longitude at sea, not to be found by firing guns, but the only true method by the sun, moon or stars.* 28 pp. 12mo. London, for Richard Mount.

London, 1714

The earth kept together and upheld in space by magnetic attraction, p. 11.

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237. **Browne, Robert.** (— — — .) *Methods, propositions and problems for finding the latitude and longitude at sea by coelestial observations only and also by Watches, etc.* 20 pp. 8vo. London, for the author. *London, 1714*
The author uses lunar distances and the position of known stars for determining latitude.
238. **Clarke, James.** (— — — .) *An essay wherein a method is humbly propos'd for measuring equal time with the utmost exactness without the necessity of being confin'd to clocks, in order to discover the longitude at sea.* 1 l.+32 pp. ill. 12mo. London, for J. Morphew. *London, 1714*
Clepsydra, in which *mercury* is used instead of water.
239. **Derham, William.** (1657-1735.) *Physico-theology; or, A demonstration of the being and attributes of God from his works of creation. Being the substance of xvi sermons, preached at Mr. Boyle's Lectures in the years 1711 and 1712. With large notes and many curious observations never before published. Third edition.* 8 l.+447 pp.+6 l. pl. 8vo. London, for W. Innys. *London, 1714*
The first edition appeared in 1713. *Magnetic orientation and variation*, p. 277; *invention of printing*, p. 278.
- 239a.— *Eighth edition.* 8 l.+xvi.+444 pp.+6 l. pl. 8vo. London, for W. Innys. *London, 1732*
—See also 263.
240. **Plank, Stephen.** (— — — .) *An introduction to the only method for discovering longitude. Presented to both Houses of Parliament.* 8 pp. 12mo. London, for the author. *London, 1714*
This "introduction" is limited to eight pages on chronometers and the determination of local time.
241. **Reimann, Christoph Friederich.** (— — — .) *De succino electricorum principe.* Praeses H. von Sanden. 36 pp. 4to. Regiomonti, Reusner. (Inaugural dissertation.) *Konigsberg, 1714*
Academic discussion of current views on electrical theory.
242. **Whiston, William.** (1667-1752) and **Humphrey Ditton.** (1675-1715.) *New method for discovering the longitude both at sea and land, humbly proposed to the consideration of the publick.* 78 pp.+1 l. 12mo. London, for John Phillips. *London, 1714*
Curves of magnetic variation, p. 15; *sound heard at a distance of 100 miles*, p. 19. Whiston was a celebrated philosopher and divine, and Professor of Mathematics at Cambridge.
—See also 245, 256.
243. **Dunnehaupt, Albert Christian.** (— — — .) *Sphaericam telluris figuram disputatio postrema.* 16 pp. 4to. Vitembergae, Chr. Schroeder. *Wittenberg, 1715*
Early work on the form of the earth.

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244. **Oostendorp, Johannes.** (— - — .) *De dimensione linearum rectorum.* 23 pp. 1 plate. 4to. Trajecti ad Rhenum, G. van der Water. (Inaugural dissertation.) *Utrecht, 1716*
Speculation on the dimension of a straight line.
245. **Whiston, William.** (1667-1752.) *An account of a surprising meteor, seen in the air March the 6th, 1715-16 at night.* 78 pp. 12mo. London, for J. Senex. *London, 1716*
Brief account of an aurora borealis seen by the author to which he adds descriptions of other remarkable aurorae.
—See also 242.
246. **Huet, Pierre-Daniel.** (1630-1721.) *History of the commerce and navigation of the ancients, made English from the Paris edition.* 16 l.+265 pp. 8vo. London, for Lintot. *London, 1717*
On p. 48 it is stated that the Greeks guided their ships by the Great Bear and the Phenicians by the Little Bear. The author, one of the most learned men of France and principal editor of the celebrated edition of the Latin classics *ad usum Delphini*, was Bishop of Avranches. Dr. Edward Weston possesses the 1600 edition of Gilbert's *De Magnete*—an uncorrected copy—which formerly belonged to Bishop Huet. It contains MS. notes, as well as the Bishop's arms and very rare book-plate.
247. **Lueders, Gerhard.** (— - — .) *De methodis demonstrandi declinationem magnetis variam et inconstantem.* 56+16 pp. 1 plate. 4to. Vitembergae, St. Gerdesianus. (Inaugural dissertation.) *Wittenberg, 1718*
Two rare pamphlets on magnetic declination with tables of same from Kircher. According to Hellmann's *Rara Magnetica*, the first printed reference to magnetic declination occurs in a work by Francisco Falero, published in 1535.
248. **Polinière, Pierre.** (1671-1734.) *Expériences de physique.* 2nd. edition. 4 l.+553 pp.+12 l. pl. 12mo. Paris, Jean de Laulne. *Paris, 1718*
Collection of typical experiments with magnets. Explanations based on the Cartesian theory of pores and screw-like particles. Magnet in vacuo, p. 265; lifting power of a N-seeking pole less in the Southern than in the Northern hemisphere, p. 269; magnetization of vertical bars, p. 271; declination and dip, p. 296; causes of electrical attraction, p. 298. There are numerous magnetic diagrams at the end of volume. First edition, 1709.
249. **Desaguliers, J(ean) T(héophile).** (1683-1744.) *Lectures of experimental philosophy, to which is added a description of Mr. Rowley's machine called the orrery, all carefully corrected by Mr. Desaguliers.* 10 l.+201 pp. 3 l. ill. 10 plates. Sm. 4to. London, for W. Mears. *London, 1719*
Fundamental principles of mechanics and hydraulics. Desaguliers held a high place among the savants of his day.
—See also 306, 364.
250. **Newton, (Sir) Isaac.** (1642-1727.) *Optice sive de reflexionibus, refractionibus, inflexionibus et coloribus Lucis libri tres.*

liquores inter se permixti, quorum particulae cum impetu concurrunt; ut *oleum vitrioli* a *nitro* pari pondere distillatum, dein dupla portione mixtum cum *oleo caryophyllorum*, sive *anis*. Similiter globus vitreus, diametro circiter 8 aut 10 unciarum, machinae versatili infixus, ut circa axem suum motu celerrimo circumagatur; qua sui parte vola manus apposita inter volvendum confricetur, lucebit. Quod si eodem tempore charta alba, aut linteam album, vel etiam digitus extremus ita admoveatur, ut circiter quarta vel dimidia unciae parte distet a vitro, qua parte motus ejus est celerimus; vapor electricus frictione manus e vitro excitatus, & ad chartam albam, linteam, vel digitum allisus, ita agitabitur, ut lucem continuo emittat, efficiatque ut charta illa alba, linteam, vel digitus, tanquam cicindela, luce scat: Quin & e vitro erumpens, ea vi nonnunquam ad digitum allidetur, ut etiam tactu percipi queat. Quod idem quoque evenit, quando cylindrus e vitro electrove, longus & amplius, charta manu admota eousque confricetur, donec vitrum incaluerit.

Qu. 9. Annon Ignis, corpus est eousque calefactum, ut copiosius lumen emittat? Quid enim aliud est ferrum candens, nisi ignis? Quidve aliud est carbo candens, nisi lignum eousque calefactum, ut id lumen emittat?

Qu. 10. Annon Flamma, vapor est, fumus, sive exhalatio candefacta; hoc est, calefacta usque eo, ut lumen emittat? Corpora enim flammam non concipiunt, nisi si emittant fumum copiosum; qui porro fumus, ardet in flamma. *Ignis fatuus*, est vapor sine calore lucens: Et

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Latine reddidit Samuel Clarke. 2nd edition. 8 l.+415 pp. 12 plates. 8vo. Londini, ex officina Gulielmi Bowyer.

London, 1719

Light emitted by bodies when agitated by heat, friction, or percussion, p. 341; electric glow, p. 342; magnetic and electric attraction, p. 380. The first edition of this famous work on theoretical optics appeared in 1704.

—See also 639.

251. Norwood, Richard. (1590 (?)-1675.) The seaman's practice, containing a fundamental problem in navigation, experimentally verified; namely touching the compasse of the Earth and Sea, and the quantity of a degree in our English measures. With certain tables and other rules used in navigation, the variation of the compass. 104 pp. 4to. London, for R. Mount.

London, 1719

Use of the compass in navigation, p. 85; first edition, 1637; Norwood was among the first to determine the length of a degree of the meridian.

—See also 284.

252. s'Gravesande, William James. (1688-1742.) Mathematical elements of physicks, prov'd by experiments; being an introduction to Sir Isaac Newton's philosophy; made English and revis'd and corrected by John Keill. 2 vols. 33 plates. 8vo. London, for G. Strahan.

London, 1720

s'Gravesande introduced the Newtonian philosophy into the University of Leyden in which he held the chair of mathematics and astronomy. (See No. 639.)

- 252a.—Mathematical elements of natural philosophy, confirmed by experiments; or, An introduction to Sir Isaac Newton's philosophy. Translated into English by J. T. Desaguliers. 3rd edition. 2 vols. 58 plates. 8vo. London, for Senex.

London, 1726

Vol. ii. belongs to the second edition. Electrical experiments, vol. ii.; electrification, a vibratory motion, p. 7; luminous mercury fountain, p. 12.

- 252b.—(Latin edition.) Physices elementa mathematica, experimentis confirmata, sive introductio ad philosophiam Newtonianam. Editio tertia. 4to. Leidae, apud Johannem Arnoldum Langerok.

Leyden, 1742

Electrical machine described, p. 669; contrivance for revolving bodies in vacuo, p. 680; electrification due to the breakage of crystals, p. 680.

—See also 448.

253. Magalotti, Lorenzo. (1637-1712.) Lettere scientifiche ed erudite. Con ritratto. xxiv+303 pp. portr. 4to. Firenze, Tartini e Franchi.

Florence, 1721

Remarkable letters on physical subjects: air pressure and the attraction of rubbed amber, p. 79; magnet in vacuo, p. 93; experiment with amber, p. 214.

- 253a.—Another edition. xii+396 pp. portr. 8vo. Milan. (Si pubblicarono nella Raccolta de Classici Italiani.) *Milan, 1806*

—See also 678.

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254. **Ode, Jacob.** (1698-1751.) *De atmosphaera.* 88 pp. 1 plate. 4to. Trajecti ad Rhenum, G. van de Water. (Inaugural dissertation.) *Utrecht, 1721*
Various phenomena of the atmosphere.
—See also 258, 277.
255. **Radae, Philipp.** (— — .) *De habitibus intellectus et voluntatis.* 40 pp. 4to. Trajecti ad Rhenum. (Inaugural dissertation.) *Utrecht, 1721*
Philosophy of volition.
256. **Whiston, Will(iam).** (1667-1752.) *Longitude and latitude found by the inclinatory or dipping needle wherein the laws are also discovered, to which is prefix'd an historical preface.* 2 l.+xxviii+115 pp.+1 l. chart. 12mo. London, for Senex. *London, 1721*
Tract on magnetic phenomena, declination and dip. Law of distance, p. 15; small oscillations, p. 28; magnetic attraction balanced against gravity, p. 30; horizontal component and total force, p. 34; lines of equal dip, p. 41; Hudson's magnetic observations, p. 53.
- 256a.—Another edition, to which is prefix'd an historical preface, and to which is subjoined Mr. R. Norman's *New Attractive* or account of the first invention of the dipping needle. 2 l.+xxviii+115 pp.+4 l.+43 pp. chart. ill. 8vo. London, for Senex. *London, 1721*
"Boussole" from box, boxel, iv.; declination said to have been discovered by Cabot in 1500, v.; variation of declination, vi.; movable magnetic poles, viii.; Halley's four poles, ix.; dip discovered, xiii.; loss of weight said to accompany magnetization; law of distance, 13; south magnetic pole, p. 54. (See No. 66.)
—See also 242.
257. **Musschenbroek, Pieter van.** (1692-1761.) *Oratio de certa methodo philosophiae experimentalis.* 53 pp. 4to. Trajecti ad Rhenum, G. van de Water. (Inaugural dissertation.) *Utrecht, 1723*
Method to be followed in experimental philosophy; the author, who was Professor of Natural Philosophy in the University of Leyden, was among the great instructors and investigators of his day.
—See also 268, 276, 300, 312, 383, 427.
258. **Ode, Jacob.** (1698-1751.) *Oratio de laudibili priscorum hominum philosophandi methodo.* 52 pp. 4to. Trajecti ad Rhenum. (Inaugural dissertation.) *Utrecht, 1723*
Discourse on the philosophical methods and systems of some ancient philosophers.
—See also 254.
- 259.* **Quellmalz, Sam(uel) Theodor.** (1696-1758.) *Dissertatio physica de magnete.* 15 pp. 4to. Lipsiae. *Leipzig, 1723*
The magnet and its poles, p. 4; magnetic effluvia, p. 5; nature of the lodestone; why artificial magnets are the stronger, p. 14.
260. **Rohault, Jacques.** (1620-1675.) *System of natural philosophy, illustrated with Dr. Samuel Clarke's notes taken mostly out*

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of Sir Isaac Newton's Philosophy, with additions done into English by John Clarke. 2 vols. 27 plates. 8vo. London, for James Knapton. *London, 1723*

Standard work on physics. Discussion of what was known on the magnet in the author's time. Attraction between the lodestone and iron is mutual, p. 163; continuity of magnetic matter; field shown by filings, p. 177; magnetization of fire-irons and church-crosses, p. 175; why armed lodestones have greater lifting power, p. 181; iron affords freer passage to magnetic matter than air, p. 186; field due to rubbed amber, p. 187; lightning and thunder, p. 219; thunderbolt and thunderstone, p. 221; effect of ringing bells during an electric storm, p. 222. (See No. 639.)

—See also 171.

261. Santanelli, Ferdinando. (— — — .) *Philosophiae reconditae sive Magicae magneticae mumialis scientiae explanatio.* 4 l.+108 pp. 4to. Coloniae. *Cologne, 1723*

Cap. xiv. is entitled "Magnets and magnetic sorcery."

262. Hooke, Robert (1635-1702) and others. *Philosophical experiments and observations by Robert Hooke and other eminent Virtuosos in his time*, published by W. Derham. 4 l.+391 pp.+4 l. ill. 4 plates. 8vo. London, W. and J. Innys.

London, 1726

Papers on various scientific subjects: history of the barometer, pp. 3 and 169; magnetism of drills and chisels, p. 129; ether the medium of propagation of light, p. 144; invention of the telescope, p. 257; magnetic declination at Alexandria, p. 300; origin of amber and jet, p. 315.

—See also 227.

263. Royal Society of London. *Miscellanea curiosa*, containing a collection of some of the principal phaenomena in nature, accounted for by the greatest philosophers of this age. Discourses read and delivered to the Royal Society; also a collection of curious travels, voyages, antiquities, and natural histories of countries; to which is added A discourse of the influence of the sun and moon on human bodies by R. E. Mead and also Fontenelle's preface of the usefulness of mathematical learning. 3rd edition. Vol. i. (complete in 3 vols.) revised and corrected by W. Derham. 8vo. London, for J. and J. Knapton. *London, 1726*

Theory of four terrestrial magnetic poles, p. 41; declination at London and Paris, p. 45.

264. Arntzen, Wilhelm. (— — — .) *De origine animae humanae.* 49 pp. 4to. Trajecti ad Rhenum, Alex. van Megen. (Inaugural dissertation.) *Utrecht, 1728*

Philosophical inquiry into the origin of the soul.

265. Geisweit, Wilhelm. (— — — .) *De figura telluris sphaerica.* 43 pp. 4to. Trajecti ad Rhenum, Alex. van Megen. (Disputatio philosophica.) *Utrecht, 1729*

Paper on the form of the earth.

Fig. 1.

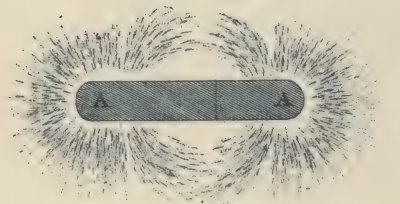


Fig. 6.

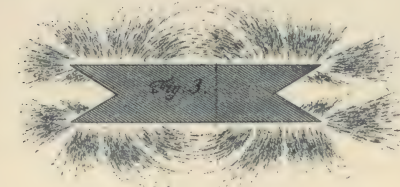
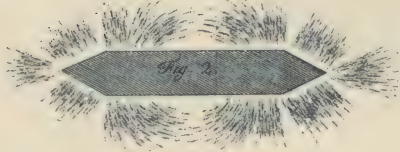
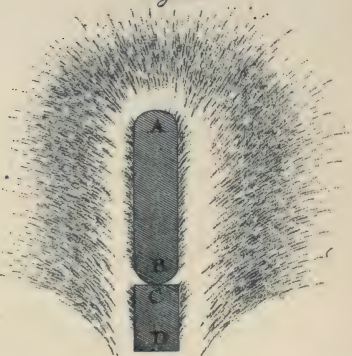


Fig. 7.

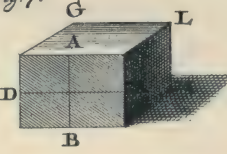


Fig. 4.



Fig. 8.

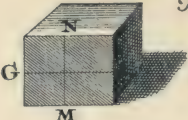


Fig. 5.

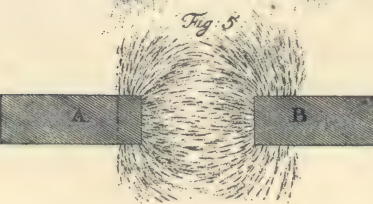


Fig. 9.



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266. (Hamilton, James) (vi. Earl of Abercorn.) (1656-1734.) Calculations and tables relating to the attractive virtue of loadstones, serving to the finding out the comparative degrees of goodness between several of them; also to know how much any loadstone, being of any proposed weight would sustain and also to know the value in money of any loadstone. 1 l.+14 pp.+28 l. 12mo. (London, 1729)
Carrying power of the lodestone with numerical data. The tables are engraved on steel plates. See Philosophical Transactions, 1729-1730.
267. Luloffs, Johann. (1711-1768.) De causis, propter quas zona torrida est habitabilis. 46 pp. 4to. Trajecti ad Rhenum, Alex. van Megen. (Disputatio Philosophica.) Utrecht, 1729
Physical conditions of the torrid zone.
—See also 275.
268. Musschenbroek, Pieter van. (1692-1761.) Physicae experimentales, et geometricae de magnete, tuborum capillarium vitreorumque speculorum attractione, magnetudine terrae, cohaerentia corporum firmorum dissertationes ut et ephemerides meteorologicae ultrajectinae. 5 l.+685 pp. 28 plates and meteorological diary, 1 table, 4to, and charts. Lugduni Batavorum, apud Samuelem Luchtmans. Leyden, 1729
Numerical data on the laws and phenomena of magnetism. Law of distance, p. 20; action of flames, p. 70; whirling magnet, p. 116; consequent poles, p. 243; declination at Paris and London, p. 150; dip, p. 206. Contains Halley's chart of magnetic lines.
—See also 257.
269. Wishoff, Coenraedt. (— - — .) De wonderwerken Godts. 1 page. 1 plate. Folio. Leyden (No. 17). Leyden, 1729
Note on a phenomenon resembling the aurora borealis.
270. Allen, John. (or Alleyn). (1660(?)-1741.) Specimina Ichnographica; or, A brief narrative of several new inventions and experiments; particularly the navigating a ship in a calm, the improvement of the engine to raise water by fire, a new method of drying malt, etc. 44 pp. 1 plate. 4to. London, printed for W. Innys. London, 1730
Tubular boiler recommended for ships; propulsion of ships by air-engines and steam-engines; interesting on account of date.
271. Amort, Eusebius. (1692-1775.) Philosophia Pollingana, in qua Summulae Logicae, Physicae, et Metaphysicae eo modo, quo in Academiis dictari solent continentur. Varia nova opuscula philosophica inseruntur. 856 pp. ill. Folio. Augustae Vindelicorum, sumptibus P. ac M. Veit et Joannis fratris haeredum. Augsburg, 1730
This work on logic and metaphysics contains a section on the nature of magnetic declination and dip together with tables and a rule for finding latitude by means of the declination.

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- 272.† **Doppelmayr**, Johann Gabriel. (1671-1750.) Historische Nachricht von den nuernbergischen Mathematicis und Kuenstlern, welche fast von dreyen Seculis her durch ihre Schrifften und Kunst-Bemuehungen die Mathematic und mehreste Kuenste in Nuernberg vor andern trefflich befoerdert und sich um solche sehr wohl verdient gemacht zu einem gutem Exempel, und zur weitem ruhmlichen Nachahmung in zweyen Theilen an das Liecht gestellet. 10 l.+314 pp.+9 l. Folio. Nuernberg, Wonath. *Nuremberg, 1730*
Biographical notices of the mathematicians and artists of Nuremberg with copious notes and references. The author was a distinguished mathematician.
—See also 274, 311.
273. **Bouguer**, (Pierre.) (1698-1758.) De la méthode d'observer en mer la déclinaison de la boussole. 3 l.+7+67 pp. 2 plates. 4to. Paris, Jombert. *Paris, 1731*
Prize essay of the Académie des Sciences for 1731, on the determination of magnetic declination at sea. The author was a celebrated mathematician.
274. **Doppelmayr**, Johann Gabriel. (1671-1750.) Physica experimentalis illustrata oder Naturwissenschaft in einem kurzen Begriff. 44 pp. 4to. Nuernberg, Joh. Fr. Ruedigers. *Nuremberg, 1731*
Syllabus of a course of lectures on experimental physics.
—See also 272.
275. **Luloffs**, Johann. (1711-1768.) Disputatio philosophica inauguralis de Aurora Boreali. 83 pp. 4to. Trajecti ad Rhenum, apud Alex. van Megen. *Utrecht, 1731*
Dissertation on the nature of polar aurorae.
—See also 267.
276. **Musschenbroek**, Pieter van. (1692-1761.) Tentamina experimentorum naturalium captorum in Accademia del Cimento et ab ejus Academiae secretario conscriptorum ex italico in latinum conversa, quibus commentarios, nova experimenta, et orationem de methodo instituendi experimenta physica addidit. 8 l.+xlvi+6 l.+193+192 pp.+7 l. 32 plates. l. 4to. Lugduni Batavorum, apud Joan. et Herm. Verbeek. *Leyden, 1731*
Screening action of iron, p. 74; magnetic force transmitted through liquids, p. 75; experiments with rubbed amber, p. 81; discharging property of flames, p. 87.
—See also 257.
277. **Ode**, Jacob. (1698-1751.) Oratio de naturali Jobi amicorumque ejus ac ipsius Dei philosophia, observationibus quibusdam illustrata. 60 pp. 4to. Trajecti ad Rhenum. (Inaugural dissertation.) *Utrecht, 1731*
Discourse on the philosophy of Job and his friends.
—See also 254.

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278. **Reibelt**, Johannes Joseph Adam. (— — —) De physicis et pragmaticis magnetis mysteriis; publice exposita praeside J. Handel. 2 parts. 13 plates. 4to. Herbipoli.

Wurzburg, 1731

Cartesian doctrine refuted, p. 20; difference between electric and magnetic attraction, p. 26; author's theory, p. 29; declination and dip, p. 77; magnetic communication denied, p. 95; how magnets may be weakened and how strengthened, p. 101; mariner's compass, Part ii. See plates.

- 279.* **Meynier**. (Ingénieur du Roi pour la Marine.) (— — —) Mémoire sur le sujet du prix proposé par l'Académie Royale des Sciences en l'année 1729, touchant la meilleure méthode d'observer sur mer la déclinaison de l'aiguille aimantée, ou la variation de la boussole. xxiv+96 pp. 4 plates. 4to. Paris, Jacques Guerin.

Paris, 1732

Compass provided with "sights" for observing the bearing of a star, in order to determine magnetic declination.

280. **Bacon**, Roger. (1214-1294.) Opus majus, ad Clementem Quartum Pontificem Romanum. Ex MS. Codice Dubliniensi cum aliis quibusdam collato nunc primum edidit S. Jebb, M.D. Londini. 15 l.+477 pp.+2 l. tab. Folio. Londini, typis Gulielmi Bowyer.

London, 1733

On page 445 of this encyclopaedic work of the great Franciscan monk will be found remarkable statements on the importance of observation and experiment for the advancement of learning. The work was written about 1265 and first printed in 1733. Friar Bacon is often called the Apostle of Experimental Science.

—See also 1437.

281. **Comrie**, Alexander. (1708-1774.) De moralitatis fundamento et natura virtutis. 17 pp. 4to. Lugduni Batavorum. (Inaugural dissertation.)

Leyden, 1734

Metaphysical dissertation presented for an academical distinction.

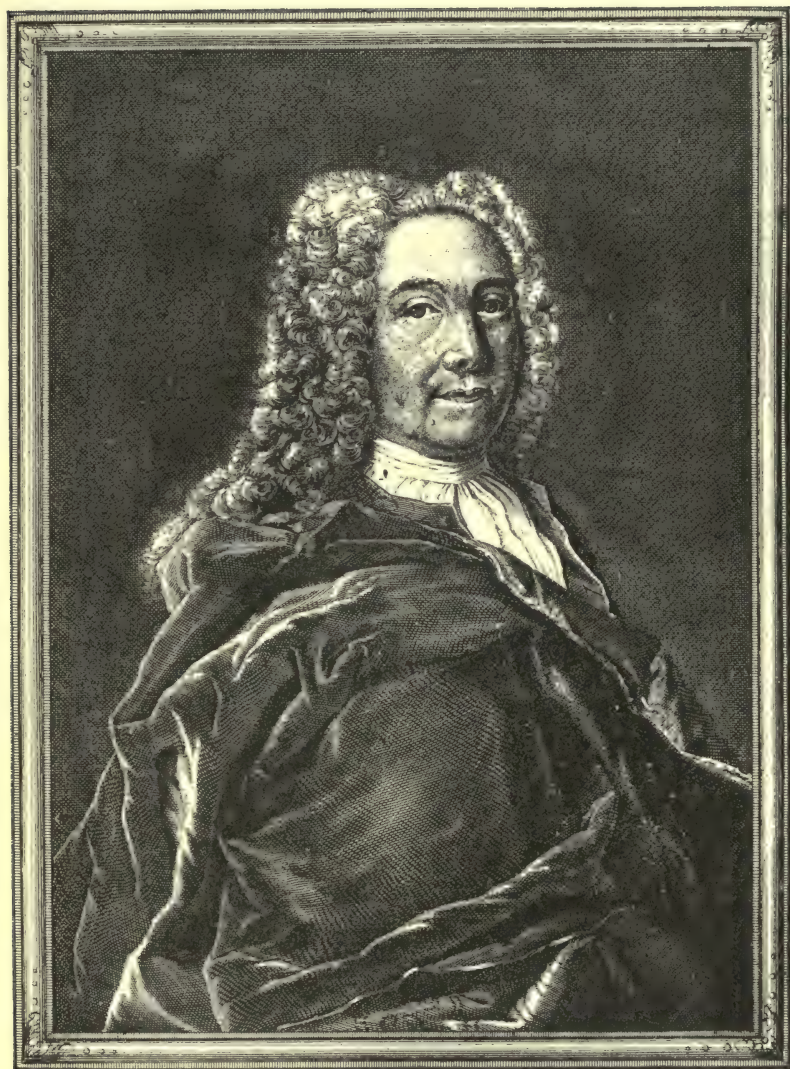
282. (**Marana**, John Paul.) (1642-1693.) Letters writ by a Turkish Spy, who liv'd five and forty years undiscover'd at Paris: giving an impartial account to the Divan at Constantinople of the most remarkable transactions of Europe and discovering several intrigues and secrets of the Christian courts (especially of that of France) from 1637 to 1682. Written originally in Arabick, translated into Italian (or rather written in Italian by G. P. Marana) from thence into English (by W. Bradshaw?) and now published with a large historical preface and index (by Dr. R. Midgley?). The eight volumes of letters writ by a Turkish Spy * * * to illustrate the whole 8 vols. (Vol. i., 22nd edition; vols. 2 to 8, 10th edition.) 12mo. London, for Straham.

London, 1734

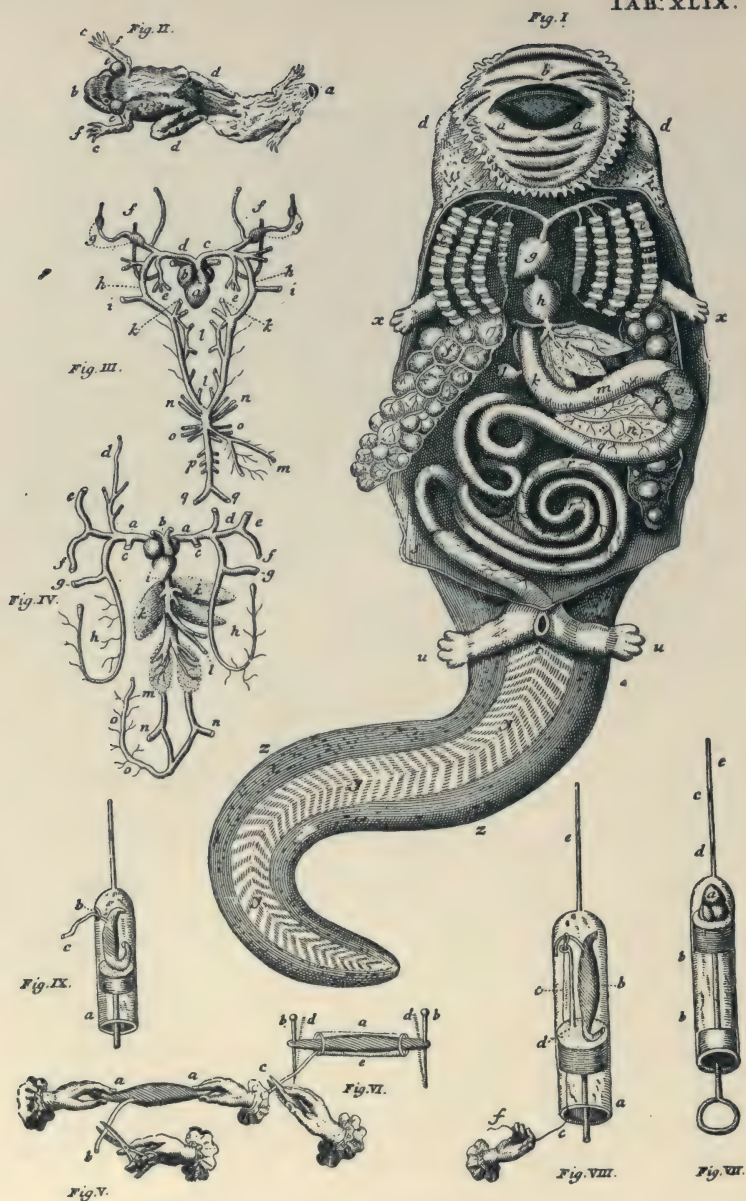
The author of this celebrated work was born in Geneva in 1642. Vol. i., the sympathetic telegraph, p. 116; Vol. ii., appreciation of Descartes and his philosophy, p. 26.

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- 282a.— —A continuation of letters written by a Turkish spy, continued from 1687-1693. Originally in Arabick, translated into Italian and from thence into English. 1 vol. 12mo. London, for W. Taylor. *London, 1718*
283. Swedenborg, Emanuel. (1688-1772.) Opera philosophica et mineralia. 3 vols. (Contents: Vol. i. Principia rerum naturalium sive novorum tentaminum phaenomena mundi. Vol. ii. Regnum subterraneum sive minerale de cupro et orichalco. Vol. iii. Regnum subterraneum sive minerale de ferro.) pl. portr. Folio. Dresdae et Lipsiae, sumptibus Friderici Hekelii.. *Dresden & Leipzig, 1734*
This is the author's famous work on science. Vol. i. contains 250 pages of printed matter with diagrams and illustrations on the causes and mechanism of magnetic force; the law of distance; magnetic declination, its causes and how its value may be calculated. Among Swedenborg's unpublished MSS. is a treatise on the magnet, 265 pp. text and 34 pp. tables, which according to the title page he intended to publish in London in 1722. Swedenborg regarded light and heat as *undulations* in the ether of space.
284. Gellibrand, (Henry) (1597-1636), (Richard) Norwood (1590 (?)-1675) and (William) Jones (1675 (?)-1749.) Epitome of Navigation. - - - First written by Gellibrand, Norwood and Jones, and now collected and digested into one compendium of navigation. 2 l.+160 pp., 3 plates. 12mo. London, for W. Mount. *London, 1735*
Determination of magnetic declination, and discovery of the secular variation of that element. Gellibrand was Professor of Mathematics in Gresham College, London. The above copy was owned by Thomas Hayward, of Liverpool, who added many MSS. notes.
—See also 109, 251.
285. Table of logarithms, for numbers increasing in their natural order from a unit to 10,000 with a table of artificial sines, tangents and secants, the radius 10,000,000. The third edition corrected. 74 l. 12mo. London, for W. Mount. *London, 1735*
Interesting on account of date of publication; the first table of common logarithms was published by Briggs in 1624.
286. Bailey, N(athan) (or Nathaniel). (? -1742.) Dictionarium Britannicum; or, A more compleat universal etymological English dictionary than any extant. Second edition, with numerous additions. By N. B. assisted by C. Gordon, P. Miller, and T. Lediard. ill. Folio. London, for T. Cox. *London, 1736*
Articles on electricity, gaggates, lyncurium, magnet, barometer.
287. Du Halde, Jean Baptiste. (1674-1743.) Description géographique, historique, chronologique, politique, et physique de l'empire de la Chine et de la Tartarie chinoise enrichie des cartes générales et particulières de ces pays, de la carte générale et des



283. SWEDENBORG. *Portrait of Author.*



291. SWAMMERDAM. (Reduced.)

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cartes particulières du Thibet, et de la Corée & ornée d'un grand nombre de figures & de vignettes gravées en taille-douce. Avec un avertissement préliminaire, où l'on rend compte des principales améliorations, qui ont été faites dans cette nouvelle édition. 4 vols., plates, and maps. 4to. A la Haye, Henri Scheurleer. *The Hague, 1736*

Vol. i., p. 270 of this celebrated work of the French Jesuit on the history of China, contains an allusion to a chariot provided with a magnet for the purpose of determining the cardinal points. The first edition appeared in 1735.

- 287a.**—(English translation.) The general history of China. Containing a geographical, historical, chronological, political and physical description of the empire of China, Chinese-Tartary, Corea and Tibet. Including an exact and particular account of their customs, manners, ceremonies, religion, arts and sciences. Done from the French of Père du Halde (by Richard Brookes). 4 vols. 4 maps and 15 plates, portr. 8vo. London, John Watts. *London, 1736*
- 288.** **Aken**, Pieter van. (— — —) De coronis et parhelis. 45 pp. 4to. Trajecti ad Rhenum, A. van Megen. (Inaugural dissertation.) *Utrecht, 1736*
Nature of parhelia and other circumsolar phenomena.
- 289.** **Herwerden**, Johannes van. (1713-1772.) De motu terrae diurno atque annuo. 48 pp. 1 plate. 4to. Trajecti ad Rhenum. A. van Megen. (Inaugural dissertation.) *Utrecht, 1736*
Thesis on the diurnal and annual motion of the earth.
- 290.** **Heyningen**, Gerard van. (— — —) De mente humana. 73 pp. 4to. Trajecti ad Rhenum. (Inaugural dissertation.) *Utrecht, 1736*
Dissertation on the human mind.
- 291.** **Swammerdam**, Jan. (1637-1680.) Biblia naturae; sive historia insectorum in classes certas redacta, necnon exemplis et anatomico variorum animalculorum examine aeneisque tabulis illustrata, insertis numerosis rariorum naturae observationibus. Accedit praefatio, in qua vitam auctoris descripsit Hermannus Boerhave. Latinam versionem adscripsit Hieronimus David Gaubius. Dutch and Latin. 2 vols. 52 plates. Folio, Leydae, apud Isaacum Severinum. *Leyden, 1737-1738*

This is the celebrated folio work on entomology of the great Dutch naturalist which was published fifty-seven years after his death. On p. 839, experiments on *frog's legs* are described in which the author obtained in 1658 muscular contractions by using silver and copper wires. This was more than a century before Galvani's experiments of a similar nature. The work is printed in parallel columns in Dutch and in Latin. The plates are of great interest.

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292. **Hadley, John.** (1682-1744.) A description of a new instrument for taking the latitude or other altitudes at sea. 30 pp.+1 l. 1 plate. 12mo. London. *London, 1738*
Description and use of the author's *Quadrant*. Franklin in his *Autobiography* attributes the invention of the *quadrant* to Thomas Godfrey, a mathematician of Philadelphia.
293. **Pointer, John.** (1668-1754.) A rational account of the weather, shewing the signs of its several changes and alterations, together with the philosophical reasons of them, to which are added, three essays towards accounting for: i. A continued course of wet years. ii. The cause of an aurora borealis. iii. The cause of the plague. Second edition, corrected and much enlarged. 224 pp. 8vo. London, for A. Ward. *London, 1738*
Meteorology in poetry; signs of thunder and lightning, p. 105; the "weather glass," p. 141; the aurora borealis, pp. 171-204.
294. **Poleni, Giovanni.** (1683-1761.) Sopra l'aurora boreale, comparsa il di 16. Dicembre, 1737. 28 pp. 4to. Venezia, P. Bassaglia. *Venice, 1738*
Description of the aurora borealis as seen in Padua and Bologna, Dec. 16, 1737, with remarks on the nature of the phenomenon.
295. **Squario, Eusebio.** (also Sguario.) (— — —.) Dissertazione sopra le aurore boreali. 120 pp. 2 plates. 4to. Venezia, P. Bassaglia. *Venice, 1738*
Mathematical and physical dissertation on the aurora borealis. The author is said to have been the earliest writer on electricity in Italy.
—See also 336.
296. **Goens, Daniel van.** (— — —) An luna habitabilis sit. 23 pp. 4to. Trajecti ad Rhenum. A. van Megen. (Inaugural dissertation.) *Utrecht, 1738*
Dissertation on the habitability of the moon.
297. **Helsham, Richard.** (1680-1738.) Course of lectures in natural philosophy, published by Bryan Robinson. viii+404 pp.+2 l. 11 plates. 8vo. London, printed for John Nourse. *London, 1739*
First edition of a frequently reprinted work.
298. **Keill, John.** (1671-1721.) Introductiones ad veram physicam et veram astronomiam quibus accedunt trigonometria, de viribus centralibus, de legibus attractionis editio novissima. 2 l.+636 pp.+5 l. 48 plates. 4to. Lugduni Batavorum, apud Joh. et Herm. Verbeck. *Leyden, 1739*
Magnetic qualities of a steel bar destroyed by fire and also by a severe blow, p. 85; electric attraction due to effluvia, p. 635. Defense of Newton against Leibnitz; Keill was an able mathematician.
299. **Mannevillette, (Jean Baptiste Nicolas Denis D'Après de),** (also Après de Mannevillette). (1707-1780.) Le nouveau quartier anglois, ou description et usage d'un nouvel instru-

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ment pour observer la latitude sur mer. 1 l.+43 pp.+1 l. 2 plates. 12mo. Paris. *Paris, 1739*

The "quartier" described here is Hadley's *Quadrant*; the author was a distinguished hydrographer.

300. **Musschenbroek**, Pieter van. (1692-1761.) Essai de physique avec une description de nouvelles sortes de machines pneumatiques, et un Recueil d'expériences par Mr. J(an) V(an) M(usschenbroek), traduit du Hollandois par Pierre Massuet. 2 vols. 914 pp.+15 l.+8+63 pp. 33 plates. 4to. Leyden, Luchtman. *Leyden, 1739*

Electric bodies, p. 254; law of magnetic attraction, p. 277; air-pump with experiments.

- 301.—Description de nouvelles sortes de machines pneumatiques, tant doubles, que simples, avec un recueil de plusieurs expériences par J(ean V(an) M(usschenbroek) que l'on peut faire avec ces machines. 63 pp. pl. 4to. Leyden, S. Luchtman. *Leyden, 1739*

- 302.—Liste de diverses machines, de physique, de mathématique, et de chirurgie, qui se trouvent chez Jean van Musschenbroek à Leyden. 8 pp. 4to. Leyden, S. Luchtman.

Leyden, 1739

List of physical and surgical apparatus.

—See also 257.

303. **Mortenson**, Johannes. (— — —) Dissertatio physica de electricitate. Praeses Samuel Klingenshierna. 2 l.+22 pp.+2 l.+pp. 24-56+1 l. Sm. 4to. Upsaliae. *Upsala, 1740-1742*

Short treatise on electricity: the electric spark, p. 46. Stated to be the first *separately* printed treatise on electricity.

304. **Ozanam**, (Jacques). (1640-1717.) Récréations mathématiques et physiques, qui contiennent plusieurs problèmes d'arithmétique, de géométrie, de musique, d'optique, de gnomonique, de cosmographie, de mécanique, de pyrotechnie, et de physique, avec un traité des horloges élémentaires. Nouvelle édition, augmentée. 4 vols. 134 plates. 12mo. Paris, Charles-Antoine Jombert. *Paris, 1741*

The first edition of this celebrated work on recreative philosophy was published in 1696. Vol. iii. contains a chapter on the magnet, p. 234. Artificial frog floating in a basin of water and indicating the hours, p. 236; white, red and blue lodestones, p. 243; the *theamedes* or repelling stone, p. 244; iron filings in glass tube, p. 245; declination and dip, p. 245; table of magnetic declination at Paris, p. 255; numerous plates.

- 304a.—Another edition. Vol. iii. 10 plates. 8vo. Paris, Jacques Rollin. *Paris, 1750*

- 304b.—(English translation). Recreations in mathematics and natural philosophy. First composed by M. Ozanam; lately recomposed and greatly enlarged in a new edition by M.

A
DISSERTATION
CONCERNING
ELECTRICITY.

By *J. T. DESAGULIERS*, LL.D. F.R.S.
Chaplain to HIS ROYAL HIGHNESS
the PRINCE of *WALES*.

To which is Annex'd;

A Letter from President *BARBOT*
perpetual Secretary of the Academy of
Bordeaux, to acquaint him that his Disser-
tation had won the Prize proposed by that
Academy to be given to the Person who
should write best upon that Subject.

L O N D O N :

Printed for *W. INNYs*, and *T. LONGMAN*.
M. DCC. XLII.

306. *DESAGULIERS*. (*Reduced.*)

CATALOGUE OF WHEELER GIFT

Montucla and now translated into English by Charles Hutton.
Vol. iv. 8vo. *London, 1803*

Montucla is the celebrated French historian of mathematics.

- 304c.—Recreations in science and natural philosophy: Dr. Hutton's translation of Montucla's edition of Ozanam. The present edition is revised by Edward Riddle, who has corrected it to the present era, and made numerous additions. xiv+826 pp. 8vo. *London, 1840*

305. (Belgrado, Giacomo). (1704-1789.) *Hydrostaticae disciplinae propositiones a Joanne Calvio.* 4+32 pp. 4to. Parmae, J. Rosati. *Parma, 1742*

Historical and critical tract on the principles of hydrostatics.

—See also 376.

306. Desaguliers, Jean Théophile. (1683-1744.) A dissertation concerning electricity; to which is annex'd a letter from President Barbot. 3 l.+48 pp.+1 l. 12mo. London, for W. Innys and T. Longman. *London, 1742*

Friction imparts vibratory motion and causes emission of effluvia, p. 2; Du Fay shows how to recognize the two electrical states called by him the vitreous and resinous, p. 33; Hauksbee's electric glow, p. 40. Desaguliers was an eminent physicist and Fellow of the Royal Society; the earliest English work *entirely* on electricity, if the tract by Boyle (See No. 178) is excepted.

—See also 249.

307. Dodson, James. (? -1757.) The anti-logarithmic canon, being a table of numbers, consisting of eleven places of figures, corresponding to all logarithms under 100,000; to which is prefix'd an introduction, containing a short account of logarithms. x+84 pp.+tables+2 l. Folio. London, for James Dodson. *London, 1742*

The introduction contains historical notes on the subject. This is one of the earliest tables of anti-logarithms or numbers corresponding to logarithms.

308. Académie des Sciences, Paris. Philosophical history and memoirs of the Royal Academy of Sciences; or, An abridgement of all the papers relating to natural philosophy which have been publish'd by the members of that society; from the year 1699-1720; the whole translated and abridged by John Martyn and Ephraim Chambers. Vols. i-iv (complete in 5 vols). 35 plates. 8vo. London, for John and Paul Knapton. *London, 1742*

Vol. i., amber, p. 186; Galvani's experiment anticipated, p. 187; magnetic declination, p. 207; Vol. iii., luminous barometer, p. 23. The Library contains a set, unabridged, of the *Histoire and Mémoires*, of the Académie des Sciences, 1666-1778, 166 vols. (See Section X.)

309. Hausen, Christian August. (1693-1743.) *Novi profectus in historia electricitatis post obitum auctoris, ex MSS. ejus editi.* Praemissa est commentatiuncula de vita et scriptis viri (by J. C. G. P. P., with a dedicatory epistle by F. J.

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Hausen). 3 l.+xii+49 pp.+1 l. 1 plate, 4to. Lipsiae, apud Theodorum Schwan. *Leipzig, 1743*

The electric field is said to be due to vortices of electric matter, p. 5. Three kinds of electric light recognized: the spark, pp. 8, 9, 42; the brush, pp. 15, 45; the glow, pp. 17, 45; the three kinds defined, p. 7; the *ether* of Newton is identical with electrical matter, p. 46

- 309a.—Another edition. Accessit V. C. Henrici de Sanden, Dissertatio de succino, electricorum principe, quam edidit et de vita B. Hausenii praefatus est Joh. Christoph Gottsched. 8l.+128 pp. 1 plate. 12mo. Lipsiae, T. Schwan. *Leipzig, 1746*

Some experiments which are considered by the author as fundamental and explained by him on the theory of electrical vortices.

310. Bose, Georg Mathias. (1710-1761.) Tentamina electrica in Academiis regiis Londiniensi et Parisiana primum habita, omni studio repetita et novis aliquot accessionibus locupletavit. Tentamina Electrica, tandem aliquando hydraulicae chymicae et vegetabilibus utilia. Pars posterior. vi+96 pp.+4 l.+xlvi pp. 4to. Wittembergae, Jo. Joach. Ahlfeld.

Wittenberg, 1744-1747

Appreciation of the work of Gilbert, Newton, Hauksbee, Du Fay and others: the electrical siphon, effect of electricity on plants, no change in weight due to electrification. Bose (Boze) is said to have added the *prime-conductor* to the electrical machine as Winkler is said to have substituted a *fixed rubber* for the hand of the operator.

311. Doppelmayr, Johann Gabriel. (1671-1750.) Neuentdeckte Phaenomena bey der fast allen Coerpern zukommenden electrischen Kraft und des dabei erscheinenden Liecht. 6+88 pp. 5 plates. 4to. Nuernberg, W. M. Endterisch und Engelbrecht. *Nuremberg, 1744*

Electrical experiments taken from Hauksbee, Gray and Du Fay with numerous references to original papers.

—See also 272.

312. Musschenbroek, Pieter van. (1692-1761) Elements of natural philosophy. Translated from the Latin by John Colson. 2 vols. 26 plates. 8vo. London, for Nourse. *London, 1744*

Effect of weather on electrified bodies, p. 188; electrified bodies in vacuo, p. 189; electrical screening, p. 189; field due to excited string, p. 190; attraction mutual, p. 191; experiments on child suspended by silken cords, p. 153; vitreous and resinous electricity, p. 195; electric effluvia move in vortices, p. 196; the magnet, p. 205; law of distance, p. 205; field mapped out by filings, p. 210.

- 312a.—(Latin edition.) Institutiones physicae conscriptae in usus academicos. 5 l.+743 pp. 1 map, 28 plates. 8vo. Lugduni Batavorum, apud Samuelem Luchtmans. *Leyden, 1748*

- 312b.—Elementa physicae. Editio altera Neapolitana. Vol. i. 11. plates. 12mo. Neapoli typis Benedicti. *Naples, 1751*

Electric bodies, p. 305; the Leyden experiment, p. 307; the magnet, p. 323.

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- 312c.—Introductio ad philosophiam naturalem. Editio prima Italica. 2 vols. 56 plates. 4to. Patavii, apud Joannem Manfré.
Patavia, 1768

Vol. i. contains a chapter on electricity, and another on the magnet. Electrification of tourmaline, p. 290; animal electricity (the torpedo), p. 294; electricity and magnetism compared, p. 345; magnetic declination, p. 360.
—See also 257.

313. Winkler, Johann Heinrich. (also Winckler.) (1703–1770.) Gedanken von den Eigenschaften, Wirkungen und Ursachen der Electricitaet, nebst einer Beschreibung zwo neuer elektrischen Maschinen. 16+168 pp. 3 plates. 12mo. Leipzig, Bernhard Christoph Breitkopf.
Leipzig, 1744

Properties, effects and causes of electricity; two new frictional machines, pp. 10, 18; size of *leather cushion*, p. 21; velocity of electric transmission, p. 70; effect of magnet on electric sparks, p. 63.

- 313a.—(Dutch translation.) Nieuwe natuurkundige ontdekkingen aangaande de eigenschappen, werkingen, en oorzaaken der electriciteyt, benevens eene beschryvinge van twee nieuwe electrische werktuigen: ut het Hoogduitsch vertaald. 8 l.+119 pp. 4 plates. 8vo. Amsterdam, Hendrik Vieroot.

Amsterdam, 1745

Two new electric machines, p. 5; rubber substituted for hand, p. 10; velocity of electric propagation, p. 48; lines of force, p. 54; charged body surrounded by an electric atmosphere, p. 71.

- 313b.—Another edition. 2 parts. 10 plates. 8vo. Amsterdam, H. W. van Welbergen.
Amsterdam, 1751

The first part treats of the properties and causes of electric phenomena; the second, investigates the qualities of electric matter and electric fire.

- 313c.—(French translation). Essai sur la nature, les effets, et les causes de l'électricité, avec une description de deux nouvelles machines à électricité. Traduit de l'Allemand. 6 l.+156 pp. 2 plates. 12mo. Paris, Sebastian Jorry.

Paris, 1748

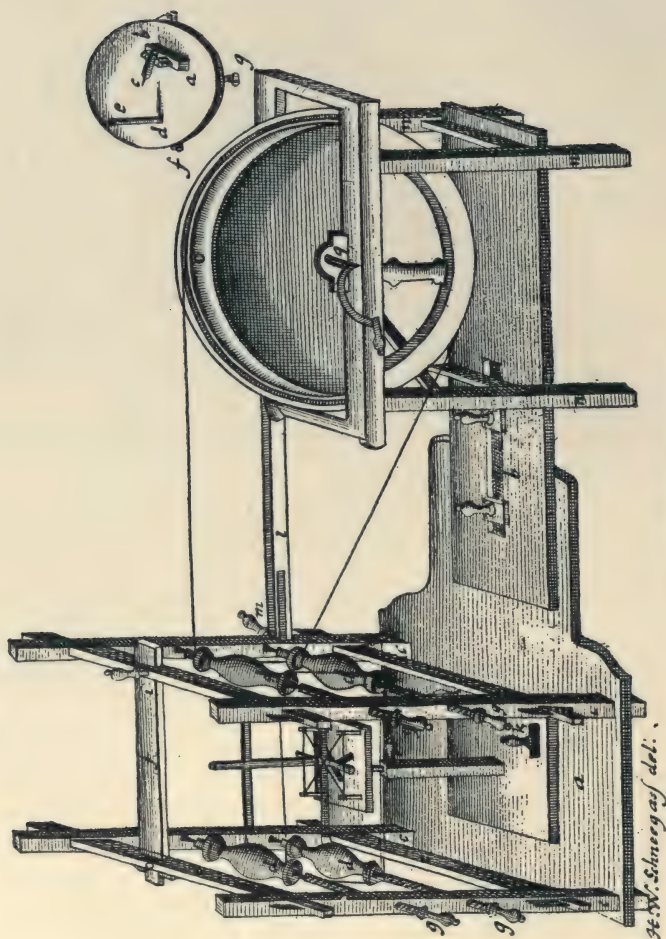
- 314.—Grundriss zu einer ausfuehrlichen Abhandlung von der Electricitaet. 16 pp. 12mo. Leipzig, Bernhard Christoph Breitkopf.
Leipzig, 1744

Outline of a treatise on electricity.

—See also 323, 335.

- 315†. Baddam, (Benjamin). (— - — .) Memoirs of the Royal Society; or, a New abridgment of the Philosophical Transactions, 1665–1740, carefully extracted from the originals, according to the order of time; the Latin tracts are Englished. Second edition. Vols. 1–5, 8, 9. (Complete in 10 vols.) 8vo. London, Nourse.
London, 1745

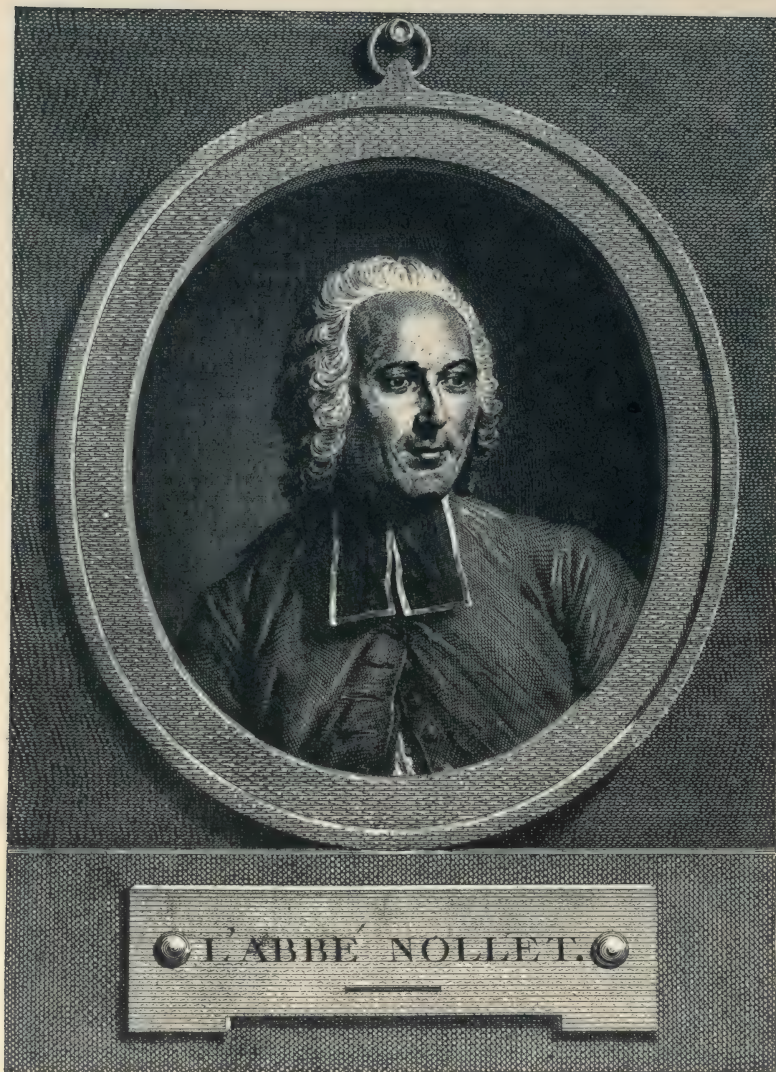
The preface contains a short, general account of the Philosophical Transactions. Vols. 3 & 4 belong to the first edition, 1739. The Library contains a complete set of the *Philosophical Transactions* unabridged, 1665 to date, the gift of Mr. Edward P. Adams. (See Section X.)



313. WINKLER. (Reduced.)

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316. **Du Fay**, Charles Francois de Cisternay. (also Cisternay Dufay.) (1698-1739.) *Versuche und Abhandlungen von der Electricitaet, derer Coerper.* Aus dem Franzoesischen ins Teutsche uebersetzt. 7 l.+xxiv+311 pp.+8 l. 12mo. Erfurt, Johann Friedrich Webern. *Erfurt, 1745*
Translation of papers by Du Fay on electricity communicated to the Académie des Sciences, in 1733-1734, preceded by a sketch of the author's life. The author describes experiments which led him to his theory of vitreous and resinous electrifications.
317. **Gordon**, Andreas. (1712-1751.) *Versuch einer Erklaerung der Electricitaet.* 5 pp.+3 l.+88 pp. 2 plates. 12mo. Erfurt, Johann Heinr. Nonne. *Erfurt, 1745*
Gordon's electrical machine, p. 6; invents the familiar device known as the electric chimes, p. 38; makes an electric *reaction-motor*, p. 45; speculates on the causes of electrical phenomena, p. 64. The author, a Scotchman, was a Benedictine monk, Professor of Natural Philosophy in the University of Erfurt. Gordon's chimes date from 1745; Franklin's, 1752.
- 317a.—Second edition. *Mit neuen Versuchen und Instrumenten vermehret. Nebst einer neuen Vorrede von dem Nutzen der Electricitaet.* 112 pp. 1 plate. 8vo. Erfurt, Joh. Heinr. Nonne. *Erfurt, 1746*
Glass *globe* replaced by glass *cylinder*, plate i.; electric chimes, p. 47; an electric motor, p. 57; experiments on the velocity of electric transmission, p. 72.
—See also 368.
318. **Krueger**, Johann Gottlob. (1715-1759.) *Zuschrift an seine Zuhoerer worinnen er ihnen seine Gedancken von der Electricitaet mittheilet und ihnen zugleich seine kuenftige Lektion bekant macht.* 56 pp.+1 l. 2 plates. 12mo. Halle, Carl Herrmann Hemmerde. *Halle, 1745*
Heat insufficient for electrification, friction required, p. 16; theory of electrical atmospheres refuted, p. 17; electric odor, p. 35; effect of electricity on the body, p. 43; electricity in medicine, p. 46.
319. **Nollet**, Jean Antoine. (1700-1770.) *Leçons de physique expérimentale.* 2^{ème} édition. 6 vols. pl. 12mo. Paris, Guerin. *Paris, 1745-1748*
Extensive treatise on physics. First edition, 1743. Vol. iv., uncertainty about the identity of lightning and artificial electricity, p. 314; nature of electricity, vol. vi, p. 407. Abbé Nollet was pronouncedly anti-Franklinian in his views.
- 319†a.—(English Translation.) *Lectures on experimental philosophy.* Translated from the French by John Colson. xlviii+278 pp. 18 plates. 8vo. London, S. Austin. *London, 1748*
—See also 329, 346, 355, 379, 430.
320. **Psellus**, (Michael Constantine). (1020-1110.) *De lapidum virtutibus, Graece ac Latine cum notis Phil. Jac. Maussaci et Joan. Steph. Bernard.* Accedit fragmentum de colore sanguis.



De la Tour Paris

Mélieu Sculpt. 1771

319. NOLLET. (See No. 4377.)

CATALOGUE OF WHEELER GIFT

nis ex doctrina medica Persarum nunc primum ex codice MS. Bibliothecae Lugduno-Batavae editum. Graece et Latine. 6 l.+164 pp.+3 l. 12mo. Lugduni Batavorum, apud Philippum Bonk.

Leyden, 1745

The author was born in Constantinople in 1020 and was considered one of the best scholars of his time. The Latin translation which accompanies the Greek text is by Philippe Jacques de Maussac (1590). *Lyncurium*, p. 23; *electrum*, p. 15; attracting and *repelling* magnets, p. 25.

321. **Vorster**, Antoine. (1706-1793.) *Tractatus de motionibus magneticis ex operibus Francisci Tertii de Lanis*, S. J. 3 l.+86 pp.+3 l. 8vo. Graecii, typis Haeredum Widmanstadii.

Gratz, 1745

Magnetic spirits (steams) flow through the pores of a magnet from pole to pole; secular variation is due to change in the position of the earth's magnetic pole. This is part ii. of the "*Tractatus*;" the first part containing 106 pages appeared in 1744.

—See also 166.

322. **Waitz**, J(acob) (Sigismund). (1698-1777.) *Abhandlung von der Electricitaet und deren Ursachen*. (Zweite Abhandlung von der Natur der Electricitaet. Dritte Abhandlung von den Eigenschaften, Wirkungen und Ursachen der Electricitaet.) 237 pp. 4 plates. Sm. 4to. Berlin, A. Haude.

Berlin, 1745

Three short treatises on the nature and effects of electricity.

- 322a.—(Dutch translation). *Over Electriciteyt en derzelver Oorzaaken*. 140 pp. 4 plates. 8vo. Amsterdam, Hendrik Vieroot.

Amsterdam, 1751

323. **Winkler**, Johann Heinrich. (also Winckler.) (1703-1770.) *Die Eigenschaften der electrischen Materie und des electrischen Feuers, aus verschiedenen neuen Versuchen erkläret und nebst etlichen neuen Maschinen zum electrifizieren beschrieben*. 14 l.+164 pp. 12mo. Leipzig, Bernhard Christoph Breitkopf.

Leipzig, 1745

Chap. i. treats of the mutual effect of two electrified bodies; chap. ii., of what occurs when a neutral body is brought near one that is electrified; electrical nature of thunderstorm; reference to *von Kleist's* discovery of the *Leyden jar*, p. 43.

- 323a.—(Dutch translation). *De eigenschappen der elektriske stoffen*. 8 l.+110 pp. 4 plates. 8vo. Amsterdam, Hendrik Vieroot.

Amsterdam, 1746

—See also 313.

324. **Istituto delle Scienze ed Arti Liberali**, Bologna. *De Bononiensi scientiarum et artium institutio atque Academia commentarii*. (Edited by F. M. Zanotti). Years 1745-1748. 2 vols. in 4. 4to. Bononiae.

Bologna, 1745-1748

Description of polar aurorae, vol. i., p. 294; also vol. ii., part i., p. 474; Vol. ii., part 3, contains a lengthy paper on the invention of the mariner's compass.

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325. **Freke, John.** (1662-1744.) An essay to shew the cause of electricity, and why some things are non-electricable; in a letter to M. William Watson. Second edition. With appendix viii+64 pp. 12mo. London, for W. Innys. *London, 1746*
Electric matter considered to be the same nature as fire; identity of lightning and electricity recognized, p. 29. (See No. 328.)
—See also 371.
326. **Kratzenstein, Christian Gottlieb.** (1723-1795.) Theoria electricitatis more geometrico explicata. 62 pp. 1 plate. 4to. Halae, Magdeb, Hemmerde. *Halle, 1746*
Series of demonstrations and corollaries in electrostatics.
—See also 436.
327. **Martin, Benj(amin).** (1704-1782.) An essay on electricity, being an enquiry into the nature, cause and properties thereof, on the principles of Sir Isaac Newton's theory of vibrating motion, light and fire; and the various phenomena of forty-two capital experiments, with some observations relative to the uses that may be made of this wonderful power of nature. 40 pp. 12mo. Bath, for the author. *Bath, 1746*
Electricity is regarded as a kind of subtile matter, the various phenomena being produced by its vibrations; analogy between lightning and electricity, p. 19.
- 328.— —A supplement (to An essay on Electricity) containing remarks on a rhapsody of adventures of a modern knight-errant (i.e. John Freke) in philosophy. 38 pp. 12mo. Bath, for the author. *Bath, 1746*
Attack on Freke's essay on "The Cause of Electricity." - (See No. 325.)
—See also 342, 398, 411, 608.
329. **Nollet, Jean Antoine.** (1700-1770.) Essai sur l'électricité des corps. xx pp.+2 l.+227 pp. 5 plates. 12mo. Paris, Guerin. *Paris, 1746*
Abbé Nollet, friend of Du Fay and Réaumur, was Professor of Experimental Philosophy in the Collège de Navarre. Electric matter is either affluent or effluent, pp. 107, 136, 160; Du Fay's distinction of vitreous and resinous electricity discarded, p. 118; 1256 feet of hempen cord electrified by excited glass tube, p. 111; electric brushes, pp. 136, 160; van Musschenbroek's Leyden phial experiment, p. 133.
- 329a.— —Third edition. xxiii+273 pp.+1 l. 5 plates. 12mo. Paris, H. L. Guerin & L. F. Delatour. *Paris, 1754*
—See also 319.
330. **Soedgren, Olaus.** (— - — .) De recentioribus quibusdam in electricitate detectis. 16 pp. 4to. Upsaliae. (Inaugural dissertation.) *Upsala, 1746*
An academical dissertation on some electrical discoveries that attracted much attention at the time.
331. **Theophrastus, (Eresius.)** (373-288 B. C.) History of stones, with an English version and critical and philosophical notes by John Hill; to which are added two letters, one to Dr.

Lightning from hence may in some measure be accounted for ; though I cannot so exactly tell what collects it together, as I can in this factitious Lightning here treated of, yet I can suppose, that the Cause of Lightning is produc'd from a great Quantity of this Fire before spoken of ; which being driven together, and included in a limited State, or Covering of some Kind, when discharged from this Covering, it goes off in an Explosion, which is Thunder. The Lightning I need not describe, being intirely the same with Electricity ; for it will kill without a Wound, and pass through every thing, as this seems to do.

I am to shew, first, the Cause of its kindling a Flame in certain compounded Liquors ; which, if what I have supposed be true, that it is by the means spoken of that this Fire is collected

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James Parsons, On the colours of the sapphire and turquoise, and the other to Martin Folkes, Upon the effects of different menstruums on copper. With a Greek and English index. xxiii+211 pp. 8vo. London, for G. Davis. *London, 1746*

The Greek text is accompanied by a literal translation. Lengthy notes on the lycurian stone, p. 73; amber, p. 79; the magnet-gem, p. 105. Theophrastus was the favorite pupil of Aristotle.

—See also 120a, 125.

332. **Turner, R(ober)T.** (— — —) Electricology; or A discourse upon electricity, being an enquiry into the nature, causes, properties, and effects thereof, upon the principles of the aether. 42 pp. 8vo. Worcester, for the author. *Worcester, 1746*
Experiments made at a distance of "one hundred feet from the machine" and explained by the elasticity and transparency of the ether. The *sensitive plant*, p. 25; the torpedo, p. 26; lightning and electricity identical, p. 34; shock localized for curative purposes, p. 39.

333. **Watson, (Sir) William.** (1715-1789.) Experiments and observations tending to illustrate the nature and properties of electricity in one letter to Martin Folkes and two to the Royal Society. With continuation and preface. Third edition. viii+59 pp. 1 plate. 8vo. London, for C. Davis. *London, 1746*
Numerous original experiments. Spirits of wine ignited by electricity, p. 20; gunpowder fired, p. 40; electric wind, crackling noise, p. 46; a vacuum has no influence on electrical attractions and repulsions, p. 46; rectilinear propagation of electricity, p. 50. (See Nos. 2308, 3495.)

- 333a.—Third edition. 32 pp. 8vo. Dublin, George Alex. Ewing.
Dublin, 1746

- 333b.—Sequel to the experiments and observations tending to illustrate the nature and properties of electricity, wherein it is presumed by a series of experiments expressly for the purpose, that the source of the electrical power and its manner of acting are demonstrated. Addressed to the Royal Society. 11.+80 pp. 1 plate. 8vo. London, for C. Davis.

London, 1746

Iron filings and mercury used for inner coating of Leyden jar, p. 13; electric (Leyden) circuit, p. 26; small bells rung by electricity, p. 56; electric ether more subtile than air, p. 50. (See No. 351.)

—See also 352, 410.

334. **Wilson, Benjamin.** (1708-1788.) Essay towards an explication of the phaenomena of electricity deduced from the aether of Sir Isaac Newton, contained in three papers, which were read before the Royal Society. xv+95 pp. 8vo. London, for C. Davis.

London, 1746

The chief agent in electrical phenomena is the ether which is the same as *electrical matter*. This exists in all bodies and is more subtile than air, p. 2; Leyden jar with coatings of water, p. 25; any particular part of the body may receive a shock, p. 25; *sheet lead* used for outer coating, p. 81.

—See also 362, 397, 446, 478, 2474.

very fine, it (as you please to make the Experiment) is either attracted, or repell'd; so that in the first Case, the End of your Finger when electrified, shall be cover'd over with the Powder, though held at some Distance; and in the other, if you electrify the Powder, it will fly off at the Approach of any non-electrified Substance, and sometimes even without it. But I can at Pleasure fire Gunpowder, and even discharge a Musket, by the Power of Electricity, when the Gunpowder has been ground with a little Camphor, or with a few Drops of some inflammable chemical Oil. This Oil somewhat moistens the Powder, and prevents its flying away; the Gunpowder then being warm'd in a Spoon, the electrical Flashes fire the inflammable Vapour, which fires the Gunpowder: But the Time between the Vapour firing the Powder is so short, that frequently they appear as the same, and not successive

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335. **Winkler, Johann Heinrich.** (also Winckler.) (1703-1770.) *Die Staerke der electrischen Kraft, des Wassers in glaesernen Gefaessen, welche durch den Musschenbroekischen Versuch bekannt geworden, erklart von H. Winkler.* 10 l.+164 pp. 9 plates. 12mo. Leipzig, Bernhard Christoph Breitkopf.
Leipzig, 1746
The Leyden jar with experiments and theory; the identity of lightning and machine electricity discussed, p. 137.
—See also 313.
- 336.* (**Squario, Eusebio.**) *Dell'elettricismo o sia delle forze elettriche de'corpi svelate dalla fisica sperimentale con un' ampia dichiarazione della luce elettrica. Aggiuntevi due dissertazioni attinenti all' uso medico di tali forze.* xvi+391 pp. 1 plate. 8vo. Venezia, presso Gio. Battista Recurti.
Venice, 1746
Different ways of electrifying bodies, pp. 119, 123, 129: Amber rubbed in vacuo, p. 158; vitreous and resinous electricity, p. 186; three kinds of electric "light" (discharges), pp. 230, 275, 312. Description of a frictional machine, p. 322.
—See also 295.
337. **Cooper, M.** *Philosophical enquiry into the properties of electricity, in which is contain'd a confutation of the solutions which have been hitherto given of it, and the most probable reason of the late surprising experiments, in a letter to a friend.* 32 pp. 12mo. London, for M. Cooper. *London, 1746*
The inquiry assumes that electrical attraction is caused by a material emanation from the attracting body and that repulsion is caused by the tendency of electrical effluvia to recede further and further.
338. **Carli, Gian Rinaldo.** (1720-1785.) *Dissertazione intorno alla declinazione, o variazione della calamita, e bussola nautica, dal polo.* xxxii pp. 1 plate. Sm. 4to. Venezia, per Benedetto Milocco.
Venice, 1747
History of magnetic declination, p. xi.; variation of the declination, p. xii.; marine compass made by the author, p. xxviii.
339. **Faure, Giovanni Battista.** (— - — .) *Congetture fisiche intorno alle cagioni de'fenomeni osservati in Roma nella macchina elettrica.* 6 l.+140 pp.+1 l. Sm. 4to. Roma, presso il Bernabo.
Rome, 1747
Electric effluvia said to be of glutinous nature, p. 44; physiological effect of the Leyden jar discharge, p. 64; electric and magnetic attractions do not follow the law of the inverse square of the distance, p. 80; law of gravitation disproved, p. 95.
340. **L—tt—n, E—m—d.** (i.e. Litton, Edmund.) (— - — .) *Philosophical conjectures on aerial influences, the probable origin of diseases with an unusual cure in the scurvy, address'd to Dr. Shaw by E—m—d L—tt—n.* 57 pp. 12mo. London, for T. Trye.
London, 1747
Electricity is mentioned in connection with the ether and with the cause of gravitation, p. 28.

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341. **Louis, (Antoine).** (1723-1792.) *Observations sur l'électricité, où l'on tâche d'expliquer son mécanisme et ses effets sur l'oeconomie animale avec des remarques sur son usage.* xxiv +175 pp. 12mo. Paris, chez Delaguette. *Paris, 1747*
Short exposition of the effects of electricity in general and on the human organism in particular. The author holds with Abbé Nollet that an electric charge is not limited to the surface of a conductor, p. 31; Cunaeus is considered to be the discoverer of the Leyden jar, p. 46.
342. **Martin, B(enjamin).** (1704-1782.) *Philosophia Britannica; or, A new and comprehensive system of the Newtonian philosophy, astronomy and geography in a course of twelve lectures, with notes, containing the physical, mechanical, geometrical, and experimental proofs and illustrations of all principal propositions in every branch of Natural Science.* 2 vols. 73 plates. 8vo. Reading, C. Micklewright & Co.
Reading, 1747
"As Britain is the birth-place of Philosophy, so English is its vernacular tongue." Chapters on electricity, magnetism, gravitation, circular motion and pendulums.
- 342a.—Supplement to the *Philosophia Britannica*, Appendix i & ii. 2 vols. Appendix i. containing new experiments in electricity, and the method of making artificial magnets. 3 plates. Appendix II containing: i. A description of a new universal compound microscope. ii. The description of a new solar microscope. iii. The description of a new glass micrometer. iv. New improvements in telescopes and microscopes by a composition of glasses. v. The description of a new reflecting telescope. vi. Of visual glasses, or the improvement of common spectacles. vii. Description of a equatorial telescope. 5 plates. 32+80 pp. 8vo. *London, 1759*
The aurora borealis an electrical phenomena, p. 15; Canton's method of making magnets, p. 27.
—See also 327.
343. **Neale, John.** (— — .) *Directions for gentlemen who have electrical machines, how to proceed in making their experiments.* 77 pp. 2 plates. 8vo. London, for the author.
London, 1747
On p. 37 van Musschenbroek is said to have discovered the Leyden jar "more by accident than by design;" Dr. Bevis uses *sheet lead* for the coating of Leyden jars and finds their efficiency to be proportional to the surface covered, pp. 45, 47. Canton discharges Leyden jars by *alternate contact*, p. 49; filings used for inner coat, p. 69.
344. **The Guardian.** (By Sir R. Steele, Joseph Addison and others.) 2 vols. 8vo. *London, 1747*
Strada's poem on sympathetic compasses, vol. ii., p. 213. (See No. 90.)
345. **Collina, Abbondio.** (1691-1753.) *Considerazioni istoriche sopra l'origine della bussola nautica nell' Europa e nell' Asia.* xvi

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+145 pp. Sm. 4to. Faenza, presso l'Archì, impress. Vesco-
vile. *Faenza, 1748*

Brief history of electrical discovery, p. 25; the compass among the Chinese,
Arabs and Portuguese, p. 102.

346. **Ellicott, John.** (1706?-1772.) Several essays towards discovering
the laws of electricity, communicated to the Royal Society
and read on the 25th February, 1747, and at two meetings
soon after; to which is prefix'd part of a letter from the
Abbé Nollet to M(artin) Folkes. 38 pp. 4to. London.

London, 1748

The author explains electric phenomena by effluvia which attract all other
bodies but which are mutually repellent, p. 10. This tract contains a
translation of Abbé Nollet's paper on *fine streams* of electrified water, also
some remarks on the influence of electricity on vegetation.

347. **Forbin, (Claude) de.** (1656-1733.) Mémoires du Comte de
Forbin. (Edited by S. Reboulet and Le Comte). 2 vols. 12mo.
Amsterdam, Francois Girardi. *Amsterdam, 1748*

St. Elmo's fires, vol. i., p. 368. In vol. ii., the pages treating of flaming
meteors are missing.

348. **Hinton, John.** (— — —) Universal magazine of knowledge
and pleasure for 1747. ill. 8vo. London, Hinton. *London, 1748*
"Boussole" or "Bossala" derived from "box," p. 118; remarks on Abbé
Nollet's experiments, pp. 119, 265.

- 349†. **Jallabert, L(ouis).** (1712-1768.) Expériences sur l'électricité,
avec quelques conjectures sur la cause de ses effets. xii+304
pp. 3 plates. 8vo. Genève, Barrillo. *Geneva, 1748*

This comprehensive work embraces the knowledge of the time on electric
phenomena and theory; it has been frequently quoted. The author considers
electricity to be a subtile, elastic fluid.

- 349a.—Another edition. 8 l.+379 pp. 3 plates. 12mo. Paris, Du-
rand. *Paris, 1749*

350. **Knight, G(owin).** (1713-1772.) An attempt to demonstrate,
that all the phenomena in nature may be explained by two
simple active principles, attraction and repulsion, wherein the
attractions of Cohesion, Gravity and Magnetism are shown
to be one and the same: and the phenomena of the latter are
more particularly explained. 1 l.+95 pp. 4to. London.

London, 1748

The attraction of cohesion, of gravitation and of magnetism are all one and
the same. The author was subsequently Principal Librarian of the British
Museum.

—See also 394.

351. **Rackstrow, B.** (— — —) Miscellaneous observations, to-
gether with a collection of experiments on electricity. With
the manner of performing them, designed to explain the
nature and cause of the most remarkable Phaenomena there-
of. With some remarks on a pamphlet, entitled: A sequel to

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the experiments and observations tending to illustrate the nature and properties of electricity (by Sir William Watson), to which is annexed a letter written by the author to the Academy of Sciences at Bordeaux, relative to the similarity of electricity to lightning and thunder. iv+72 pp. 8vo. London, for the author. *London, 1748*

The author holds that electricity and the ether of space are one; curious list of non-electrics, p. 24; list of experiments made by the author, p. 28; lightning due to electricity, pp. 65, 72. (See No. 333b.)

352. **Watson, (Sir) William.** (1715-1787.) An account of the experiments made by some gentlemen of the Royal Society in order to discover whether the electrical power would be sensible at great distances, with an inquiry concerning velocities of electricity and sound; to which are added, Some further inquiries into the nature and properties of electricity. i l.+90 pp. ill. 8vo. London, for C. Davis. *London, 1748*

Le Monnier's experiment in a pond near the Tuilleries, p. 3; Watson's experiment on the Thames, p. 5; the coatings of the Leyden jar used on this noteworthy occasion were iron filings and sheet lead, p. 5; one-mile circuit, p. 40; velocity of sound and electricity, pp. 42, 47; flashes inside jar at time of discharge, p. 74. We owe the term *circuit* to Watson, who established the law that the resistance to electric flow depends on the length and material of the conductors.

—See also 333.

353. **Borbone, Filippo.** (— — —) I fenomeni elettrici con i corollari da lor dedotti e con i fonti di cio che rende malagevole la ricerca del principio elettrico. xii+44 pp. 4to. Parma, G. Rosati. *Parma, 1749*

Experiments showing the behavior of "electric matter."

354. **N(eedham), (John) T(urbervill.)** (1713-1781.) Extract of a letter from Paris, concerning some new electrical experiments made lately there. (Signed: T. N., i.e., J. T. Needham). Copied from Phil. Trans., R. S. Vol. 44, pp. 247-273, (1748). 7 pp. 4to. *London, (1749)*

The experiment of the Leyden jar is described on p. 3 where its discovery is attributed to van Musschenbroek; the residual charge is noticed on p. 4.

- 355†. **Nollet, (Jean Antoine).** (1700-1770.) Recherches sur les causes particulières des phénomènes électriques. xxxvi+444 pp. 8 plates. 12mo. Paris, Guerin. *Paris, 1749*

The author lays down a theory, according to which the cause of electrical phenomena is the "effluence and affluence" of a subtle fluid which is everywhere present. Some interesting experiments are described with vacuum tubes also on the influence of electric charges on the growth of plants.

- 355a.— —Nouvelle edition. xxxvi+444 pp. 8 plates. 12mo. Paris, Guerin. *Paris, 1754*

—See also 319.

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356. **Boullanger.** (— — —.) *Traité de la cause et des phénomènes de l'électricité.* 2 vols. 2 plates. 8vo. Paris, Pecquet.
Paris, 1750
 In part i. it is said that bodies which are most susceptible of electrification are transparent and brittle, p. 63; construction of the first cylindrical electrical machine attributed to *Andrew Gordon*, a Scotch Benedictine, living at Erfurt, p. 23; dark-colored ribbons most strongly attracted, p. 124; Part ii. propagation of electricity, p. 4; principle of the *siphon recorder*, p. 59; experiments with flames, p. 67.
- 357*. **Dutour,** Etienne François. (1711-1784.) *Explication de deux phénomènes de l'aimant, sur les différences qu'apportent les secousses données à-un carton sur lequel ou étend de la limaille de fer à l'arrangement de cette limaille présentée à la pierre d'aimant.* (Mém. Math. et Phys. Vol. i. pp. 375-382.) 4to.
Paris, 1750
 On the effect of tapping paper when covered with iron filings and resting on a magnet.
358. **Michell,** J(ohn) (also Michel). (1724-1793.) *Treatise of artificial magnets; in which is shewn an easy and expeditious method of making them, and also a way of improving the natural ones and of changing or converting their poles; directions are likewise given for making the mariner's needles.* 1 l.+81 pp. 1 plate. 8vo. Cambridge, Bentham.
Cambridge, 1750
 Recognition of the law of the *inverse square* for magnetic attraction and repulsion, p. 19; method of "double touch;" consequent poles, p. 57; ring magnet, p. 80.
- 358a.—Second edition corrected. 78 pp. 1 plate. 8vo. Cambridge, Bentham.
Cambridge, 1751
- 358b.—(French translation.) *Traité sur les aimans artificiels; Contenant une méthode courte et aisée pour les composer et leur donner une vertu supérieure à celle des aimans ordinaires, une manière d'augmenter la force des aimans naturels et de changer leurs poles; Un moyen de faire des aiguilles de boussoles meilleures que celles qui sont en usage, et de leur communiquer une vertue plus forte et plus durable.* Traduits de deux ouvrages Anglois de J. Michell et J. Canton, par le P. Rivoire de la C. de J. Avec une préface historique du traducteur, où l'on expose les Méthodes et les Expériences de MM. Duhamel and Antheaume de l'Académie des Sciences pour perfectionner ces aimans. Avec figures. vii+cxix+160 pp. 4 plates. 12mo. Paris, par Hippolyte Louis Guerin.
Paris, 1752
359. **Moro,** Antonio Lazzaro. (1687-1764.) *Lettera o sia dissertazione sopra la calata de' fulmini dalle nuvole.* 131 pp. 12mo. Venezia.
Venice, 1750
 Minerals liable to be struck by lightning, p. 6; lightning due to the ignition of inflammable exhalations, p. 25; the interval of time between seeing the lightning and hearing the thunder depends on the distance of the discharge, p. 29.

Fifthly, The Poles of Magnets are not at their Extremities, but at a little distance from thence; that is, Magnets are not so Magnetical at the Ends, as in the Middle; and in spring-temper'd and soft Steel Magnets, the Poles are generally somewhat farther from the Extremities than in hard ones.

* *Sixthly*, The Attraction and Repulsion of Magnets decrease, as the Squares of the distances from the respective Poles increase.

This property, from some experiments I have made myself, and from those I have seen

c 2 of

equality, the greater the distance of the two Magnets is, with which the experiments are made; and *vice versa*: And so great is the effect of Magnets on each other, that, when the repellent Poles of a large Magnet and a small one are brought into contact, the small one sometimes have its Repellency changed into Attraction.

* There have been some, who have imagined, that the decrease of the Magnetic Attraction and Repulsion is inversely as the Cubes of the distances; others, as the Squares; and others, that it follows no certain ratio at all, but that it is much quicker at greater distances, than at small ones, and that it is different in different Stones: amongst these last is Dr. *Brook Taylor*, and *P. Muschenbroek*, who seem to have been pretty accurate in their experiments. [See *Philosoph. Transf.* No 368 and 390. or Vol. VI. Part II. Page 253 and 255. *Eames's Abridgement.*] The conclusions of these Gentlemen were drawn from their

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360. **Pietsch, J(ohann) G(ottfried.)** (— — —) Abhandlung von der Erzeugung des Salpeters. (Gedanken von der Vermehrung des Salpeters.) 46 pp. 4to. Berlin, A. Haude. *Berlin, 1750*
Prize-essay on the production of potassium nitrate.
361. **Stukeley, William.** (1687-1765.) The philosophy of earthquakes, natural and religious, Or an inquiry into their cause and their purpose. Second edition. 2 parts. (In the first edition only one part was published.) 61+32 pp. 8vo. London.
London, 1750
Polar aurorae, fire-balls and lightning are all considered to be electrical effects.
- 362†. **W(ilson), B(enjamin.)** (1708-1788.) A treatise on electricity. By B. W. xiii+223 pp. 5 plates. 8vo. London, Davis.
London, 1750
Discharging property of points, edges and flame, p. 7; Smeaton's condensing air-pump, p. 24; the term *electric circuit* in reference to a condenser, p. 67; lead used for coatings of Leyden jar, p. 71; shock given to any particular part of the body, p. 88; identity of the universal ether with electricity, p. 95; the ether, p. 100; all bodies may be electrified, p. 111; effect of discharge on the body, p. 208; magnetic polarity *inverted* by the jar discharge, p. 219.
- 362a.—Second edition. 10+224 pp. 4 plates. 8vo. London, C. Davis.
London, 1752
—See also 334.
363. **Barhow, L.** (— — —) Richtig angestellte und aufrichtige mitgetheilte Observationes von dem seit eines halben Seculi sich in den meisten europaeischen Laendern sehr merklich zeigenden und bekannt gewordenen Phaenomeno, unter dem Namen von Nord-Licht. 5 l.+104 pp. 1 plate. 12mo. Frankfurt, F. C. Mumme.
Frankfort, 1751
Observations on the aurora borealis.
364. **Desaguliers, Jean Théophile.** (1683-1744.) Cours de physique expérimental, traduit de l'anglois par le R. P. Pezenas. 2 vols. 68 plates. 4to. Paris, Jacques Rollin.
Paris, 1751
—See also 249.
- 365*. **Digard, (de Kerguette, J.)** (1717- ?) Discours sur la facilité et l'utilité des mathématiques. 32 pp. 4to. Paris.
Paris, 1751
General considerations on algebra and geometry and the ease with which these subjects may be studied.
366. **Euler, Leonhard.** (1707-1783.) Opusculorum Tomus iii. continens novam theoriam magnetis ab illustr. Academia regia scientiarum Parisiana praemio condecoratam 1744 una cum nonnullis aliis dissertationibus. 1 l.+165 pp. 4 plates. 4to. Berolini, sumptibus Ambr. Haude.
Berlin, 1751
Euler adopts the Cartesian doctrine of pores and magnetic particles, magnetic matter is more subtle than the ether itself and is propagated through a magnet in one direction only, p. 10; declination and dip explained, p. 30. The author was the celebrated Swiss mathematician.
—See also 635, 958.

EXPERIMENTS
AND
OBSERVATIONS
ON
ELECTRICITY,

MADE AT

Philadelphia in America,

BY

Mr. BENJAMIN FRANKLIN,

AND

Communicated in several Letters to Mr. P. COLLINSON,
of *London*, F. R. S.

L O N D O N :

Printed and sold by E. CAVE, at *St. John's Gate*. 1751.
(Price 2s. 6d.)

367. FRANKLIN. (*Reduced.*)

CATALOGUE OF WHEELER GIFT

367. Franklin, Benjamin. (1706-1790.) Experiments and Observations on Electricity, made at Philadelphia in America, By Mr. Benjamin Franklin, and Communicated in several Letters to P. Collinson of London, F. R. S. 2 l.+86 pp.+1 l. 1 plate. 4to. London, Printed and sold by E. Cave.

London, 1751

Celebrated work of the American philosopher. The terms positive and negative, pp. 3, 15; action of pointed conductors, pp. 10, 57; lead used for the *inner coat* of Leyden jar, p. 16; discharge by *alternate contact*, p. 21; an insulated jar cannot be charged, p. 25; analogy of charged jar and *bent spring*, p. 23; seat of charge, p. 24; Franklin's pane, p. 25; electric dinner, p. 34; aurorae, p. 46; common matter self-attractive, electrical matter self-repellent, p. 51. Copies of this edition are rare.

"These experiments and discoveries, which have given Franklin such fame, were the work of four men: Benjamin Franklin, Philip Syng, Thomas Hopkinson and Ebenezer Kinnersley; but, owing to Franklin's writing of them to England, they were published in his name, and have redounded to his credit solely." (Ford, P. L., Franklin Bibliography.)

- 367a.—New Experiments and Observations on Electricity. Made at Philadelphia in America, by Benjamin Franklin, Esq., and Communicated in Several Letters To Peter Collinson, Esq., of London, F. R. S. Part i. the second edition. 2 l.+86 pp. Part ii. 2 l.+pp. 89-107+1 l. Part iii. By Benjamin Franklin, Esq., Communicated to P. Collinson, Esq., of London, F. R. S. And read at the Royal Society June 27, and July 4, 1754. To which are added A Paper on the same subject by J. Canton, M. A., F. R. S. and read at the Royal Society Dec. 6, 1753; and another in defense of Mr. Franklin against the Abbé Nollet, by Mr. D. Cobden, of New York. Part iii. 4 l.+pp. 111-154. 4to. London, Printed and sold by D. Henry and R. Cave.

London, 1754

Remarks on Abbé Nollet's letter on electricity, by Mr. David Cobden (pp. 130-142.) Electrical experiments, with an attempt to account for their several phenomena; together with some observations on thunder-clouds, in further confirmation of Mr. Franklin's observations on the positive and negative electrical states of clouds, by John Canton (pp. 143-152.) (See No. 379.)

- 367b.—Experiments and Observations On Electricity made at Philadelphia in America, by Benjamin Franklin, LL.D. and F.R.S. To which are added, Letters and Papers on Philosophical Subjects. The Whole corrected, methodized, improved, and now first collected into one volume, and illustrated with Copper Plates. 4 l.+496 pp. 5 plates 4to. London, Printed for David Henry; and sold by Francis Newbery.

London, 1769

- 367c.—The Fifth Edition. 2 l.+vi+514 pp.+8 l. 7 plates. 4to. London, Printed for F. Newbery.

London, 1774

- 367d.—(French translation.) Expériences et Observations sur l'Electricité faites à Philadelphie en Amérique; et commu-

A
T R E A T I S E
O N T H E
N A T U R E a n d P R O P E R T Y
O F
F I R E.

I n T H R E E E S S A Y S.

- I. Shewing the Cause of VITALITY, and MUSCULAR MOTION; with many other *Phænomena*.
- II. On ELECTRICITY.
- III. Shewing the Mechanical Cause of MAGNETISM; and why the Compass varies in the Manner it does.

By JOHN FREKE, Surgeon to *St. Bartholomew's* Hospital, *London*, and F.R.S.

-----*In magnis & voluisse sat est.* PROP.ERT.

L O N D O N:

Printed for W. INNYS, and J. RICHARDSON, in
Pater-noster Row.

M.DCC.LII.

371. FREKE.

CATALOGUE OF WHEELER GIFT

niquées dans plusieurs lettres à Mr. P. Collinson de la Société Royale de Londres. Traduites de l'Anglois (par M. d'Alibard et le Comte de Buffon). 24+1xx pp.+5 l.+222 pp.+16 l. plate. 8vo. A Paris, chez Durand. *Paris, 1752*

These Philadelphia letters were translated by M. d'Alibard at the request of Count de Buffon; they attracted considerable attention and led d'Alibard and others to experiment with pointed conductors; d'Alibard's experiment at Marly, vol. ii., p. 119.

- 367e.—Seconde édition. Revue, corrigée & augmentée d'un supplément considérable du même Auteur, avec des Notes & Expériences nouvelles. Par M. d'Alibard. 2 vols. 2 l.+349 pp.+1 l. plate. 8vo. Paris, chez Durand. *Paris, 1756*

This edition contains the *Supplementary Experiments*.

- 367f.—(German translation.) Des Herrn Benjamin Franklin, Esq. Briefe von der Elektricitet. Aus dem Engländischen uebersetzt, nebst Anmerkungen von J. C. Wilcke. 13 l.+354 pp. plate. 8vo. Leipzig, verlegt Gottfried Kiesewetter, Buchh. in Stockholm. *Leipzig, 1758*

—See also 449, 481, 529, 675, 696.

368. Gordon, Andreas. (1712-1751.) *Physicae experimentalis elementa* (in usum Academiae Erfordiae). 2 vols. 49 plates. 12mo. Erfordiae, litteris Nonnianis. *Erfurt, 1751-1753*

The lodestone, pp. 231-246; *glass cylinder* substituted for glass globe, p. 248; electricity useful in case of paralysis, p. 278; it causes evaporation, p. 279; electrified birds lose weight, p. 282.

—See also 317.

- 369†. Grollier de Servières, Nicolas. (1593-1686.) *Recueil d'ouvrages curieux de mathématique et de mécanique; ou, Description du cabinet de Monsieur Grollier de Servières*. Seconde édition. 13 l.+152 pp. 88 plates. 4to. Paris. *Paris, 1751*
Collection of full-page designs including clocks, lamps, pontoon-bridges, rafts, and machinery of various kinds. The first edition appeared in 1719, The author was a mechanical genius.

370. Ludolff, C(hristian) F(riederich), (the younger). (1707-1763.) *Mémoire sur l'électricité des baromètres*. Traduit du Latin. (Mém. de l'Acad. Roy. des Sc. de Berlin, 1749, pp. 1-7.) 7 plates, 4to. *Berlin, 1751*

Production of electricity in a barometer by friction of the mercury against the sides of the tube.

371. Freke, John. (1662-1744.) *Treatise on the nature and property of fire, in three essays*. i. Shewing the cause of vitality, and muscular motion with many other phenomena. ii. On electricity. iii. Shewing the mechanical cause of magnetism; and why the compass varies in the manner it does. viii+196 pp.+13 l. 8vo. London, for W. Innys and J. Richardson. *London, 1752*

Identity of electricity and lightning, p. 105; fire is the cause of electricity and magnetism, pp. 65, 145; the ether of space, p. 125; *electricity* not as good a term as *vivacity*; electrified bodies have magnetic properties, p. 165.

—See also 325.

DELL' ELETTRICISMO ARTIFICIALE,

E

NATURALE LIBRI DUE

DI

GIAMBATISTA BECCARIA

DE' CC. RR. DELLE SCUOLE PIE.



IN TORINO MDCCLIII.

Nella Stampa di Filippo Antonio Campana.

375. BECCARIA. (*Reduced.*)

CATALOGUE OF WHEELER GIFT

372. **Mangin**, (l'Abbé). (? -1772.) Histoire générale et particulière de l'électricité; ou, ce qu'en ont dit de curieux et d'amusant quelques physiciens de l'Europe. 3 vols. 1 plate. 12mo. Paris, Rollin. *Paris, 1752*
Statement of the work and discoveries of physicists from Gilbert to Franklin; part ii. exposes and discusses the various theories proposed; part iii. describes the effects of electricity on the body and its value in curative medicine. Quérard states that this work has been erroneously attributed to Guer, a lawyer.
373. **Penrose**, Francis. (1718-1798.) Treatise on electricity, wherein its various phenomena are accounted for and the cause of the attraction and gravitation of solids assigned; to which is added, a short account how the electrical effluvia act upon the animal frame. 40 pp. 8vo. Oxford. *Oxford, 1752*
Machine electricity is attributed to the friction of air between the glass-globe and the hand of the operator, p. 16; the earth is devoid of attraction, p. 25; electric effluvia and light, p. 36.
—See also 380.
374. (**Bazin**, Gilles Augustin). (? -1754.) Description des courants magnétiques dessinés et gravés d'après nature en xv planches, suivie de quelques observations sur l'aiman par M. de l'Académie des Belles-Lettres de la Rochelle et Correspondent de l'Académie Royale des Sciences de Strasbourg. 2 l.+54 pp.+1 l. 15 plates. 4to. Strasbourg, Jean-François de Le Roux. *Strasbourg, 1753*
The magnetic field illustrated with numerous diagrams and plates. A supplement appeared in 1754.
- 375†. **Beccaria**, Giacomo Battista. (1716-1781.) Dell' elettricismo artificiale, e naturale libri due. 4 l.+245 pp. 4to. Torino, Filippo Antonio Campana. *Turin, 1753*
This (first) edition of an important work contains the author's early contributions to the subject of atmospheric electricity; Beccaria adopted the Franklinian theory. The author was an Italian priest and professor of experimental physics at Turin. For English translation, see No. 457. (See No. 1465.)
—See also 392bis, 424, 435bis, 450, 457.
376. **Belgrado**, Jacobo. (1704-1789.) Della riflessione dei corpi dall' acqua e della diminuzione della mole de Sassi ne' Torrenti, e ne Fiumi dissertazioni due. xi+99 pp. 1 plate. 4to. Parma, nella R. D. stamperia Monti. *Parma, 1753*
Discussion of the phenomena of reflection and refraction at plane surfaces.
—See also 305.
377. **Eeles**, Henry. (1700-1781?) Philosophical essays. Folio. *Lismore, 1753-1761*
The cause of thunder; electrical theory; reflection and refraction of light; medical effects of electricity. Manuscript letters of Major Eeles of Lismore with commentary on each by Robert J. Lecky. (See Nos. 433, 2456.)
- 377a.—Philosophical essays in several letters to the Royal Society, with a preface. xlix+189 pp. 8vo. London, for G. Robinson and J. Roberts. *London, 1771*
Original considerations on the dual nature of electricity in which the author

and am now here to join my intrèates with his, that you may be happy for ever."

To relate all that was said upon this occasion, would be to extend my story to another paper. Willson was all submission and acknowledgment; the wife cried and doubted, and the widow vowed an eternal separation. To be as short as possible, the harmony of the married couple was fixed from that day. The widow was handsomely provided for, and her child, at the request of Mrs Willson, taken home to her own house; where at the end of a year she was so happy, after all her distresses, as to present him with a sister, with whom he is to divide his father's fortune. His mother retired into the country; and, two years after, was married to a gentleman of great worth; to whom, on his first proposals to her, she related every circumstance of her story. The boy pays her a visit every year, and is now with his sister upon one of these visits. Mr Willson is perfectly happy in his wife; and has sent me, in his own hand, this moral to his story:

"That though prudence and generosity may not always be sufficient to hold the heart of a husband, yet a constant perseverance in them will, one time or other, most certainly regain it."

To the author of the SCOTS MAGAZINE.

S I R, Renfrew, Feb. 1. 1753.

IT is well known to all who are conversant in electrical experiments, that the electric power may be propagated along a small wire, from one place to another, without being sensibly abated by the length of its progress. Let then a set of wires, equal in number to the letters of the alphabet, be extended horizontally between two given places, parallel to one another, and each of them about an inch distant from that next to it. At every twenty yards end, let them be fixed in glass, or jeweller's cement, to some firm body, both to prevent them from touching the earth or any other non-electric, and from breaking by their own gravity. Let the electric gun-barrel be placed at right angles with the

extremities of the wires, and about an inch below them. Also let the wires be fixed in a solid piece of glass, at six inches from the end; and let that part of them which reaches from the glass to the machine, have sufficient spring and stiffness to recover its situation after having been brought in contact with the barrel. Close by the supporting glass, let a ball be suspended from every wire: and about a sixth or an eighth of an inch below the balls, place the letters of the alphabet, marked on bits of paper, or any other substance that may be light enough to rise to the electrified ball; and at the same time let it be so contrived, that each of them may reassume its proper place when dropt. All things constructed as above, and the minute previously fixed, I begin the conversation with my distant friend in this manner. Having set the electrical machine a-going as in ordinary experiments, suppose I am to pronounce the word *Sir*; with a piece of glass, or any other *electric per se*, I strike the wire S, so as to bring it in contact with the barrel, then *i*, then *r*, all in the same way: and my correspondent, almost in the same instant, observes these several characters rise in order to the electrified balls at his end of the wires. Thus I spell away as long as I think fit; and my correspondent, for the sake of memory, writes the characters as they rise, and may join and read them afterwards as often as he inclines. Upon a signal given, or from choice, I stop the machine; and taking up the pen in my turn, I write down whatever my friend at the other end strikes out.

If any body should think this way tiresome, let him, instead of the balls, suspend a range of bells from the roof, equal in number to the letters of the alphabet; gradually decreasing in size from the bell A to Z: and from the horizontal wires, let there be another set reaching to the several bells; one, *viz*, from the horizontal wire A to the bell A, another from the horizontal wire B to the bell B, &c. Then let him who begins the discourse bring the wires in contact with the barrel, as before; and the electrical spark, breaking on bells of different

CATALOGUE OF WHEELER GIFT

controverts the views by Franklin. An account of the author's life is given in a letter written by Robert J. Lecky to Latimer Clark, and dated April 12, 1878.

378. **M(arshall), C(harles) or (Charles Morrison.)** (— - — .) A printed letter. Scots Magazine, Vol. xv., pp. 73-74. 8vo.

Edinburgh, 1753

The letter signed C. M., p. 73, contains the earliest known reference to an *electric telegraph*; the letters C. M. stand for Charles Marshall of Paisley according to Latimer Clark and for Charles Morrison of Greenock according to Sir David Brewster, (No. 1315) and Latimer Clark, (5389). Very rare. —See also 1315, 1498, 1698, 1771, 1929, 2208, 3224, 5389.

379. **Nollet, (Jean Antoine).** (1700-1770.) Lettres sur l'électricité, dans lesquelles on examine les dernières découvertes qui ont été faites sur cette matière, et les conséquences que l'on en peut tirer. xii+264 pp. 12mo. Paris, Guérin et Delatour.

Paris, 1753

Six letters written to Franklin often controverting his views; letter to Jallabert of Geneva and Bose of Wittenberg; theory of effluent and affluent matter; papers by Symmer and Birch with remarks by the author. (See No. 367a.)

- 379a.—(Another edition.) Dans lesquelles on soutient le principe des effluences & affluences simultanées contre la doctrine de M. Franklin, & contre les nouvelles prétentions de ses partisans. Seconde Partie (complete in 2 vols.) 12mo. Paris, Guérin et Delatour.

Paris, 1760

- 379b.—(Another edition.) Lettres sur l'électricité, dans lesquelles on trouvera les principaux phénomènes qui ont été découverts depuis 1760; avec des discussions sur les conséquences qu'on en peut tirer. Troisième partie. Second edition (Complete in 3 vols.) 12mo. Paris, Durand.

Paris, 1770

—See also 319.

380. **Penrose, Francis.** (1718-1798.) Essay on Magnetism; or, An endeavour to explain the various properties of the loadstone; together with the causes of the same. 40 pp. 12mo. Oxford.

Oxford, 1753

Magnetism is due to "the powerful action of incumbent fluids" or ether streams, p. 25; there is no absolute vacuum in nature, p. 17.

—See also 373.

381. **Rabiqueau, Ch(arles).** (— - — .) Le spectacle du feu élémentaire; ou, Cours d'électricité expérimentale, où l'on trouve l'explication, la cause et le mécanisme du feu dans son origine, etc. (Lettre sur la mort de M. Richmann. Relation curieuse et intéressante pour le progrès de la physique et de la médecine.) 21.+296 pp.+2 l. 10 plates. 8vo. Paris, Jom-
bert.

Paris, 1753

Experiments on the nature and effects of the electric discharge in illustration of the author's views; death of Prof. Richmann of St. Petersburg while experimenting with atmospheric electricity in 1753.

ESSAY SUR L'ELECTRICITE DES CORPS • FRONTISPICE



379. NOLLET. *Frontispiece.*

CATALOGUE OF WHEELER GIFT

382. **Mairan**, (Jean Jacques d'Ortous de). (1678-1711.) *Traité physique et historique de l'aurore boréale*. (Suite des Mémoires de l'Académie pour 1731). Seconde édition, revue et augmentée. 570+xxii pp. pl. 4to. Paris, Imprimerie Royale.
Paris, 1754
Inquiry into the history and physics of the aurora borealis; the chapter on the relation between the aurora and the magnetic declination is of special interest. The first edition appeared in 1733. (See No. 2452.)
383. **Musschenbroek**, Pieter van. (1692-1761.) *Dissertatio physica experimentalis de magnete*. Lugduni Batavorum anno 1729 edita nunc vero auditoribus oblata. 2 l.+283 pp. 10 plates. 4to. Viennae, typis Joannis Thomae Trattner. *Vienna, 1754*
Edition of 1729 enlarged.
—See also 257.
384. **New and complete dictionary** of arts and sciences, comprehending all the branches of useful knowledge with accurate descriptions. Extracted from the best authors in all languages by a Society of Gentlemen. Vols. 2 & 3. (Complete in 4 vols.) pl. 8vo. London for W. Owen. *London, 1754*
In article on electricity, Franklin's kite experiment is described in detail, vol. ii., p. 1040; in vol. iii., Canton's method of making magnets, p. 1971.
385. **Béraud**, Laurent. (1703-1777.) *Theoria electricitatis*. (Appendix to Johann Albrecht Euler's *Disquisitio de causa physica electricitatis*.) pp. 95-144. 4to. (Petropoli).
(St. Petersburg, 1755)
Electric matter is a subtle fluid distinct from elementary fire yet sometimes assuming its form and properties. The phenomena of attraction and repulsion, lightning, thunder, etc., are considered in Part iii. Béraud was a French Jesuit and astronomer. (See No. 386.)
386. **Euler**, Johann Albrecht. (1734-1800.) *Disquisitio de causa physica electricitatis, una cum aliis duabus dissertationibus de eodem argumento*. 28 pp. 4to. Petropoli.
St. Petersburg, 1755
Prize essay on the physical cause of electricity in which the electrical fluid is identified with the ether. The author was son of Euler, the celebrated mathematician. (See No. 385.)
387. **Frisi**, Paolo. (1728-1784.) *De existentia et motu aetheris seu de theoria electricitatis ignis et lucis, dissertatio*. pp. 29-94. 4to. (Petropoli).
(St. Petersburg, 1755)
Electricity a phenomenon of the ether. Electric light in rarefied media, p. 67; Beccaria's experiments on atmospheric electricity, p. 81.
388. **Premoli** (Carlo). (— - —) *Nova electricitatis theoria*. 91 pp. 1 plate. 12mo. Mediolani, Fr. Agnellum. *Milan, 1755*
Speculations on the nature of electric force.
389. **Salchow**, Ulrich Christoph. (1722-1787.) *Explicatio separationis auri ab argento per aquam fortem factae et modi vilioris haec duo metalla a se invicem segregandi*. 19 pp. 4to. Petropoli.
St. Petersburg, (1755)
Chemical process for the separation of gold from silver.

CATALOGUE OF WHEELER GIFT

390. **Cartier, Gallus.** (— - — .) *Philosophia eclectica ad mentem et methodum celeberrimorum nostrae aetatis philosophorum concinnata, et in quatuor partes, logicam nempe, metaphysicam, physicam et ethicam distributa. Accedunt Exercitationes philosophicae et Elementa Geometriae.* 4 l.+46 +74+495+41 (Index)+132+2 (Errata) pp. 15 plates. 4to. Augustae Vindelicorum et Wirceburgi, J. Adam et Fr. A. Veith. *Augsburg & Wurzburg, 1756*
References to lightning and St. Elmo's fires, p. 312; amber, p. 328; the magnet, declination and dip, p. 330; the invention of the compass, p. 330.
- 391*. **Lovett, R(ichard).** (1692-1780.) *The subtil medium prov'd; or, That wonderful power of nature, so long conjecture'd by the most ancient and remarkable philosophers which they call'd sometimes aether; but oftener elementary fire, verifi'd. Giving an account of the progress and several gradations of electricity, from those ancient times to the present; its various uses in the animal oeconomy, the method of applying it, etc.* 3 l.+141 pp.+2 l. 8vo. London, for J. Hinton. *London, 1756*
Dialogue on the nature and properties of electrics and non-electrics, followed by cases showing the healing power of electricity.
- 391a.—*Sir Isaac Newton's aether realized; or, The second part of The subtil medium prov'd, and electricity rendered useful, being a vindication of that essay, in answer to the animadversions made thereon by the Monthly Review.* 77 pp. 8vo. London, for the author. *London, (1759)*
Electricity and the Newtonian ether are held to be identical.
- 391b.—*The reviewers review'd; or, The bushfighters exploded; being a reply to the animadversions, made by the author of the Monthly Review, on a late pamphlet, entitled Sir Isaac Newton's aether realiz'd. To which is added, by way of appendix, Electricity, render'd useful in medicinal intentions.* 3 l.+41 pp. 8vo. Worcester, for the author. *Worcester, 1760*
Original views concerning the existence of an electric medium; its identity with the Newtonian ether defended.
- 391*c.—*A letter to the authors of the Monthly Review; or, a reply to their animadversions on a pamphlet lately published, intitled, The reviewers review'd.* 2+27 pp. 8vo. London, for the author. *London, 1761*
Polemical pamphlet on the author's electro-etheric views.
—See also 417, 447.
392. **Nebel, D(aniel) W(ilhelm).** (1735-1805.) *De magnete artificiali.* 68 pp. 4to. (Inaugural dissertation.) *Trajecti ad Rhenum, Joh. Broedelet. Utrecht, 1756*
Discussion of the magnetic work of Mitchell, Knight and others, with illustrations of experiments.

CATALOGUE OF WHEELER GIFT

- 392† bis. **Beccaria**, Giambattista. (1762-1781.) *Dell' elettricismo*. Lettere . . . dirette al sig. Giacomo Bartolomeo Beccaria, professore di chimici nell' Istituto di Bologna. Coll' appendice di un nuovo fosforo descritto all'illustre sig. conte Ponte di Scarnafigi. 378 pp. 4to. *Bologna, 1758*
The several main headings of the book are *Dell' elettricismo artificiale, e naturale; Dell' elettricismo terrestre atmosferico; Di' un nuovo fosforo, e della spiegazione di esso*. (See Nos. 435bis, 450, 457.)
—See also 375.
- 393†. **de M. G. C.** (*i.e.*, J(ohn) B(aptiste) **Girardin**.) (? -1783.) *Reflexions physiques, en forme de commentaire, sur le chapitre huitième du livre des Proverbes, depuis le verset vingt-deux jusqu'au verset trente-un par M. G. C. de M. (i.e., J. B. Girardin, curé de Mailleroncourt.)* 434 pp.+6l. 12mo. *Paris, Vautrin. Paris, 1758*
Remarks on cosmic physics with reference to certain controverted passages of Scripture.
394. **Knight**, G(owin). (1713-1772.) Collection of some papers formerly published in the Philosophical Transactions relating to the use of Dr. Knight's magnetical bars with some notes and additions. 23 pp. 8vo. *London. London, 1758*
The author's method (separate touch) of making strong magnets, p. 14; polarity of ship's compasses destroyed by lightning, p. 17.
—See also 350.
395. **Aepinus**, F(ranz Maria) U(lrich) T(heodor). (1724-1802.) *Tentamen theoriae electricitatis et magnetismi; accedunt dissertationes duae, quarum prior, phaenomenon quoddam electricum, altera magneticum, explicat, instar supplementi Commentariorum Academiae Imperialis Petropolitanae.* 390 pp. 7 plates. 4to. *Petropoli Typis Acad. Scient. St. Petersburg, (1759)*
The author, a pioneer investigator, adopts and modifies Franklin's one-fluid theory; submits electrical phenomena to mathematical analysis. Electrification of tourmaline, p. 77; affinity of electricity and magnetism, p. 187; the author's well-known form of condenser, pp. 88, 355; magnetism of the earth, p. 257.
—See also 400.
396. **Egeling**, J. (— - — .) *Disquisitio physica de electricitate.* 55 pp. 4to. *Trajecti ad Rhenum, J. Broedelet. Utrecht, 1759*
Paper of some historic interest on electricity and the phenomena of electric discharge.
397. **Hoadley**, (Benjamin). (1706-1757.) and (Benjamin) **Wilson**. (1708-1788.) *Observations on a series of electrical experiments, with alterations and the addition of some experiments, letters, and explanatory notes by B(enjamin) Wilson.* Second edition. 2 l.+86 pp. 4to. *London, for T. Payne. London, 1759*
The electric fluid and the universal ether are the same. The first edition appeared in 1756.
—See also 334.

TENTAMEN THEORIAE
ELECTRICITATIS
ET
MAGNETISMI.

Accedunt Dissertationes duae, quarum prior,
phaenomenon quoddam electricum, altera.
magneticum, explicat.

A V C T O R E

F. V. T. AEPINO

Acad. Scient. Imper. Petropolitanae, Regiae Berolinensis et
Elect. Mogunt. Erford. Membro.

Instar Supplementi Commentar. Acad. Imper. Petropolitanae.

P E T R O P O L I

TYPIS ACADEMIAE SCIENTIARVM.

395. AEPINUS. (*Reduced.*)

CATALOGUE OF WHEELER GIFT

398. **Martin**, Benjamin. (1704-1782.) Young gentleman and lady's philosophy, in a continued survey of the works of nature and art, by way of dialogue. 2 vols. 52 plates. 8vo. London.
London, 1759-1763
Lightning and the aurora borealis, p. 289; death of Professor Richmann of St. Petersburg, p. 324.
—See also 327.
399. **Scarella**, Giambattista. (1711-1779.) De magnete libri quatuor. 2 vols. 1 plate and 1 map. 4to. Brixiae, excudebat Joannes-Maria Rizzardi.
Brescia, 1759
Magnetic theory and method of making magnets. Objections to magnetic effluvia, Book ii., p. 122; how magnets are made, p. 279; Book iii., tables of declination and dip, p. 217.
400. **Aepinus**, F(ranz Maria) U(lrich) T(heodor). (1724-1802.) Akademische Rede von der Aehnlichkeit der elektrischen und magnetischen Kraft. 44 pp. 12mo. Leipzig, J. Fr. Gladitsch.
Leipzig, 1760
Address on the similarity of electric and magnetic forces.
—See also 395.
- 401*. **Oberst**, Joseph. (— — —) Conjecturae arbitrariae circa triplicem magnetis naturam una cum Placitis Scoti-Sophicis. 48 pp. 12mo. Augustae Vindelicorum.
Augsburg, 1760
On the three-fold power of the magnet; attractive, directive and inductive.
402. **Symmer**, Rob(ert). (? -1763.) New experiments and observations concerning electricity. With a letter from J. Mitchell, 59 pp. 4to. London, Davis & Reymers.
London, 1760
Pamphlet of considerable interest. The author's two-fluid theory stated, p. 36. "I think we may fairly conclude that what is called *negative* electricity is, in reality, a *positive* active power," p. 38.
403. **Wesley**, John. (1703-1791.) The desideratum; or, Electricity made plain and useful by a lover of mankind, and of common sense. 72 pp. 12mo. London.
London, 1760
Quaint *résumé* of electrical knowledge. The discharge of a Leyden jar will "give polarity to a fine needle, will invert the polarity of a compass," p. 21; list of cures effected by electrical treatment from which the author concludes that electricity "is the noblest medicine yet known in the world," p. 72. The author was the founder of Methodism.
- 403a.—Fourth edition. 72 pp. 12mo. London, R. Hawes.
London, 1778
- 403b.—Another edition. vii+72 pp. 12mo. London, Ballière, Tindal & Co.
London, 1871
—See also 700.
404. **Croker**, Temple Henry. (1730?-1790?.) Experimental magnetism; or, The truth of Mr. Mason's discoveries in that branch of natural philosophy proved and ascertained. x+72 pp. 2 plates. 12mo. London, for J. Coote.
London, 1761
The invention of the compass, p. 2; declination and dip first observed, p. 4; central terrestrial magnet denied, p. 48; magnetic perpetual-motion machine, p. 61.

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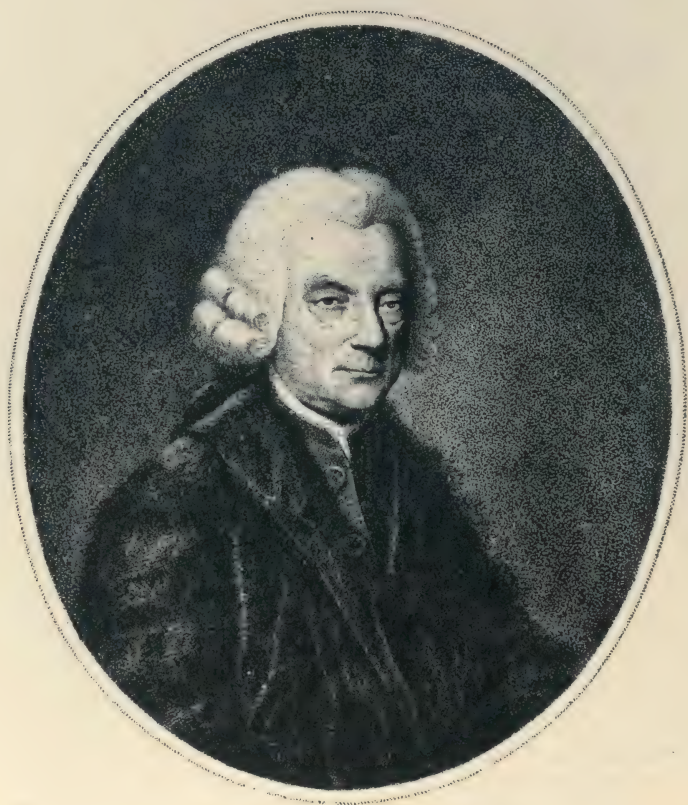
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403a. WESLEY.

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Canton suggests an *amalgam* of tin and mercury for use with frictional machines, p. 4; flap of *oiled silk*, p. 4; Henley's "electrometer," p. 24. The Dollonds were famous London opticians.
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—See also 500, 622.
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Work on natural magic; sympathetic compasses, p. 228.
408. **Bertrand, E(lie).** (1712-1790.) Dictionnaire universel des fossiles propres et des fossiles accidentels. xxxii+606 pp. 12mo. Avignon, Louis Chambeau. *Avignon, 1763*
List of writers on the magnet, p. 14. Bertrand was a Swiss naturalist.
409. **(Harrison, John).** (1693-1776.) An account of the proceedings, in order to the discovery of the longitude: in a letter to the Right Honourable xxxxx, member of Parliament. 46 pp. 4to. *London, 1763*
The proceedings referred to in the title extended from 1714-1763.
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History of a case in which electricity was applied for remedial purposes.
—See also 333.
411. **Martin, Benjamin.** (1704-1782.) Biographia philosophica, being an account of the lives, writings and inventions of the most eminent philosophers and mathematicians, who have flourished from the earliest ages of the world to the present time. With a portrait of Isaac Newton. 2 l.+565 pp.+1 l. 8vo. London, W. Owen. *London, 1764*
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—See also 327.



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410. WATSON. (*See No. 4377.*)

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412. **Wilcke**, Johan Carl. (1732-1796.) Tal, om magneten, hallet for
* Kongl. Vetensk. Academien vid Praesidi nedlaggande. 44
pp. 8vo. Stockholm, Lars Salvius. *Stockholm, 1764*
Magnetic history with special reference to declination.
413. **L'espion Chinois**; ou, l'envoyé secret de la cour de Pekin, pour
examiner l'état présent de l'Europe, traduit du Chinois (par
Ange Goudar). 2 vols. 2 plates. 12mo. Cologne. *Cologne, 1764*
Work of some celebrity though containing little of scientific interest. Vol.
i., sympathetic magnetic telegraph, p. 116; vol. ii., appreciation of Descartes,
p. 26.
414. **Brugmans**, Anton, (1732-1789.) Tentamina philosophica de
materia magnetica, ejusque actione in ferrum et magnetem.
4 l.+237 pp. 6 plates. Sm. 4to. Franequerae, Gulielmus
Coulon. *Franeker, 1765*
Propositions on the nature and phenomena of magnetism followed by
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The author discovered in 1778 the repulsion of bismuth by a magnet.
—See also 470.
- 415*. **Boscovich**, Ruggiero Giuseppe (also Boskovic, Ruder Josip).
(1711-1787.) Dissertatio de lunae atmosphaera. 1 l.+111 pp.
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The object of the dissertation is to show that the moon has no atmosphere.
The author was an eminent Italian Jesuit, astronomer and philosopher.
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parts, containing an inquiry into the nature and properties of
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dix, a clear account of the variation of the needle. (The
Appendix is entitled: A brief theory of the North Magnetic
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Franklin's kite, p. 148; detailed account of De Romas' kite experiments,
p. 150; needles magnetized, and polarity reversed by jar discharges, p. 409.
—See also 391.
418. **Poncelet**, (Polycarpe). (Flourished 18th cent..) La nature dans
la formation, du tonnerre et la reproduction des êtres vivans

DES PLAISIRS. 155
vement de vibration, qu'ils conservent pendant un temps sensible; les nerfs ne sont point des cordes tendues, ni des corps rigides. Car dans ce cas, une seule impression momentanée feroit durer les sensations, ce qui répugne à l'expérience. En effet dès qu'on ferme l'œil, dès qu'on bouche l'oreille, les sensations cessent. Au lieu qu'elles continueroient, si les nerfs avoient un mouvement sensible de vibration (*).

(*) Cette supposition paroît confirmée par une expérience assez curieuse. Si l'on joint deux pièces, l'une de plomb & l'autre d'argent, de sorte que les deux bords fassent un même plan, & qu'on les approche sur la langue on en sentira quelque goût, assez approchant au goût de vitriol de fer, au lieu que chaque

420. SULZER.

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pour servir d'introduction aux vrais principes de l'Agriculture.
2 vols. 3 plates. 12mo. Paris, P. G. LeMercier. *Paris, 1766*
Causes and effects of lightning and laboratory electricity; use of points
discourtenanced, p. 117.

419. **Swinden**, J(an) H(endrik) van. (1746-1823.) De attractione.
79 pp. 1 plate. 4to. (Inaugural dissertation.) Lugduni Ba-
tavorum, Th. Haak. *Leyden, 1766*
Mathematical treatment of certain problems in attraction.
—See also 476, 496.

420. **Sulzer**, (Johann Georg). (1720-1779.) Nouvelle théorie des
plaisirs, avec des réflexions sur l'origine du plaisir par Mr.
Kaestner. 2 l.+363 pp. 12mo. (no place.) *1767*
Inquiry into the causes of agreeable sensations; Sulzer discovered *Galvanic*
taste by placing his tongue between two plates, one of silver and the other
of lead, connected together by a wire. (See p. 155.)

- 421*. **Paulian**, A(imé) H(enri). (1722-1801.) L'électricité soumise à
un nouvel examen, dans différentes lettres adressées à M.
l'Abbé Nollet. Par l'auteur du Dictionnaire de Physique. xlviii
+286 pp.+1 l. 12mo. Avignon, Girard & Franc. Seguin.
Avignon, 1768

The first part contains nine letters addressed to Abbé Nollet in which the
author defends his views as contained in the article "Electricité" of his
Dictionnaire de Physique. 3 vols., 1761. In the second part, the principles
of the subject are treated in Latin and in accordance with the scholastic
method; the author was a French Jesuit.

422. **Priestley**, Joseph. (1733-1804.) Familiar introduction to the
study of electricity. 51 pp. 7 plates 4to. London, for J.
Dodsley. *London, 1768*

Electrical pencil (positive brush) and star (negative brush), p. 24; Lane's
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purposes to be a "Familiar explication of the fundamental principles of
electricity mixing theory with facts and illustrating chiefly those experiments
which are the most entertaining," p. 7.

- 422a.—Second edition. 85 pp.+1 l. 8 plates. 8vo. London, for J.
Dodsley. *London, 1769*

—See also 445, 453, 466, 565, 590, 602, 2459.

423. **Savérien**, Alex(andre). (1722-1805.) Histoire des philosophes
modernes avec leur portrait ou allégorie. Vol. vi. Histoire
des physiciens. 12mo. Paris, Librairie Ordinaire. *Paris, 1768*
Sketch of the life and work of eight physicists including Rohault, Boyle,
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424. **Beccaria**, G(iovanni) B(attista). (1716-1781.) Experimenta,
atque observationes quibus electricitas vindex late consti-
tuitur, atque explicatur. 2 l.+66 pp. 1 plate. 4to. Augustae
Taurinorum, ex typographia regia. *Turin, 1769*

Numerous experiments in electricity made by the distinguished Italian
priest and philosopher.

—See also 375.

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Reference to the properties of the magnet, ancient authors being freely quoted: pp. 202-207; cause of thunder, p. 191. The original French edition appeared in 1766.
426. **Guyot**, (Edmé-Gilles). (1706-1786.) Nouvelles récréations physiques et mathématiques; contenant ce qui a été imaginé de plus curieux dans ce genre, et ce qui se découvre journellement. 4 vols. 72 plates. 8vo. Paris, Gueffier. *Paris, 1769-1770*
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The first volume of this important text-book on natural philosophy contains one hundred closely printed pages on electricity and magnetism; references frequently given. The translator was himself a distinguished physicist.
—See also 257.
428. **Volta**, Alessandro. (1745-1827.) De vi attractiva ignis electrici, ac phaenomenis inde pendentibus ad Joanem Bapt. Beccariam dissertatio epistolaris. lxxii pp. 4to. Novo-Comi. Typis Octavii Staurengi. *Como, 1769*
This work on the attractive force of electric fire was Volta's first contribution to science. He published it at the age of twenty-four; it is held in esteem.
—See also 511bis, 570b, 603, 655, 726, 731, 736, 853, 2481.
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Experiments illustrating phenomena in electrostatics. The work closes with a chapter on the medical uses of electricity. This is one of the best early treatises on electricity.
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- 429*b.—Third edition. 2 l.+140 pp. 3 plates. 8vo. London, for W. Strahan. (A reprint.) *London, 1778*
—See also 800, 819.
- 430.† **Nollet**, Jean Antoine. (1700-1770.) L'art des expériences; ou, Avis aux amateurs de la physique, sur le choix, la construction et l'usage des instruments; sur la préparation et l'emploi des drogues qui servent aux expériences. 3 vols. 54 plates. 12mo. Paris, Durand. *Paris, 1770*
Practical instructions for students' use in constructing physical apparatus; a suggestive and helpful manual.
—See also 319.

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Milan, 1771
 The author describes the electrical experiments of his days and seeks to explain them by the one-fluid theory as propounded by Franklin.
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 Effect of electricity on the development of the animal organism; electricity pervades all media, p. 56; identical with the ether, p. 58.
433. [**Henley, William.**] (? -1779.) Theory of electricity. (Manuscript) 4to. *1771*
 This manuscript is an exposition by William Henley, F.R.S., of the theoretical views of electricity held by Major Eeles of Lismore. (See No. 377.)
 —See also 2463.
- 434*. **Sigaud de la Fond, (Jean René).** (1740-1810.) Traité de l'électricité; pour servir de suite aux Leçons de physique. xxx+413 pp.+1 l. 12 plates. 12mo. Paris. *Paris, 1771*
 Special chapter on the relation between electric and magnetic matter. *Leçons de physique*, of which the present work is a continuation, was published in 1767.
 —See also 455, 505, 543bis, 654.
435. **Symes, Richard.** (— - — .) Fire analysed; or, The several parts of which it is compounded clearly demonstrated by experiments, and the manner and method of making electricity medicinal and healing confirmed by a variety of cures. vii +87 pp. 8vo. Bristol. *Bristol, 1771*
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- 435† bis. **Beccaria, Giambattista.** (1716-1781.) Eletticismo artificiale. 1772.—Della elettricità terrestre atmosferica a cielo sereno. 1775.—Nuovi sperimenti. 1780. viii+439+54+19 pp., plates. 4to. Torino, nella reale stamperia. *Turin, 1772-1780*
 For English translation of the first two parts, see No. 457. The third part refers to investigations on static discharges in oil between the immersed balls of an electroscope. (See No. 392bis, 450.)
 —See also 375.
436. **Kratzenstein, Christian. (Gottlieb).** (1723-1795.) Physikalische Briefe. I. Von dem Nutzen der Electricitaet in der Arzneywissenschaft. II. Beweis, dass die Seele ihren Koerper baue. 4th edition. 102 pp. 1 plate. 12mo. Halle, C. H. Hemmerde. *Halle, 1772*
 Some applications of electricity to medicine. The author was the founder of a system of electro-therapeutics.
 —See also 326.

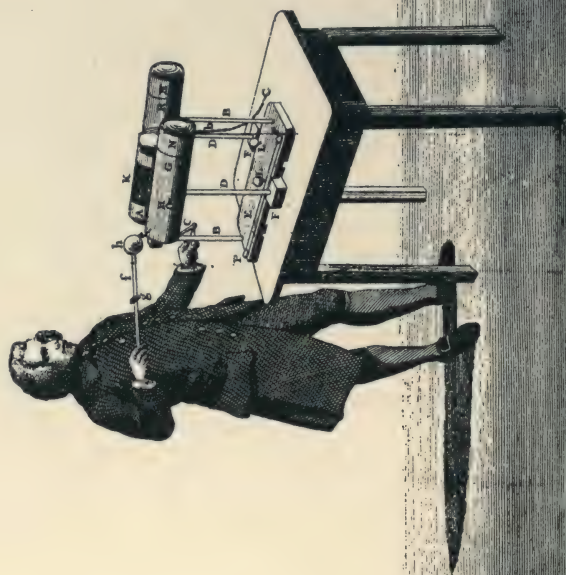
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- 437*. **Lenglet**, du Fresnoy. N(icole). (1674-1755.) *Méthode pour étudier l'histoire, avec un catalogue des principaux historiens; accompagné de remarques sur la bonté de leurs ouvrages, et sur le choix des meilleures éditions. Nouvelle édition par Drouet.* 15 vols. 12mo. Paris, Debure. *Paris, 1772*
The author was a learned prelate and *littérateur*; brief history of various countries. Vol. xiv. contains an outline of the history of science and art. The first edition appeared in 1718 under the initials N. L. du F.
438. (**Becket**, John Brice). (— — —.) An essay on electricity, containing a series of experiments introductory to the study of that science with a view of facilitating its application and extending its utility in medical purposes. xv+151 pp. 8vo. Bristol, for J. B. Becket. *Bristol, 1773*
The Franklinian theory is adopted throughout the essay. Part ii. treats of the medical effects of electricity. Pointed rods as lightning conductors, p. 133.
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Portuguese tract treating of the construction and protective function of lightning-rods. Methods of exploring the air, p. 5; Réaumur's Leyden-jar experiment, p. 14; experiments of de Romas, p. 22.
440. **Dempster**, George. (1735-1818.) Account of the magnetic mountain of Cannay. (New Annual Register, 1773, pp. 149-150.) 8vo. *Edinburgh, 1773*
Short communication showing how a compass was affected by basaltic rocks. (From Trans. Soc. Antiquaries of Scotland, vol. i.).
441. **Lous**, Christian Karl. (1724-1804.) *Tentamina experimentorum ad compassum perficiendum et unicuique usui tam nautico quam terrestri accomodandum; ut et ad virium magneticarum quantitatem explorandam et aestimandam spectantium.* iv+130 pp. 8 plates. 4to. Hafniae, Philibert. *Copenhagen, 1773*
Work of exact, magnetic measurements. Instruments for determining declination, p. 7; a vibrating magnet considered as a pendulum, pp. 35, 97; experiments with vibrating magnets, p. 37; measurements of declination, p. 85; the dipping needle, p. 125.
442. **Mills**, John. (— — —.) An essay on the weather; with remarks on the shepherd of Banbury's rules for judging of its changes; and directions for preserving lives and buildings from the fatal effects of lightning. Second edition. xv+127 +viii pp. 12mo. London, for S. Hooper. *London, 1773*
Efficiency of pointed conductors, p. 16; Franklin's views adopted, p. 69. First edition appeared in 1770.

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443. **Nairne**, Edward. (1726-1806.) Directions for using the electrical machine as made and sold by E. Nairne. 11 pp. 1 plate. 8vo. *London, 1773*
 Flap of oiled silk, p. 4; Canton's electric amalgam, p. 10. Nairne was the inventor of the electrical machine which bears his name.
- 444.—Experiments on two dipping-needles, April 21, 1772, which dipping-needles were made agreeable to a plan of the Rev. Mr. Mitchell, and executed for the board of longitude. 7 pp. 1 plate. 8vo. *London, Bowyer & Nichols.. London, 1773*
 The axis of a dipping-needle is supported on friction-wheels.
 —See also 484, 513, 518, 2470.
445. **Priestley**, J(oseph). (1733-1804.) An account of a new electrometer, contrived by Mr. William Henley, and of several electrical experiments made by him; in a letter from Dr. Priestley, F.R.S. to Dr. Franklin, F.R.S. 8 pp. 1 plate. 4to. *London, W. Bowyer and J. Nichols. London, 1773*
 This is the "quadrant electrometer" or common electric semaphore of our text-books.
 —See also 422.
446. **Wilson**, B(enjamin). (1708-1788.) Observations upon lightning, and the method of securing buildings from its effects, in a letter to Sir Charles Frederick. 4 l.+68 pp. 4to. *London, for Lockyer Davis. London, 1773*
 The author gives his reasons for differing from the other members of the committee appointed to consider the best method of protecting the Purfleet magazine against lightning. They recommended pointed conductors but Wilson advised conductors with knobs. The appendix contains details of the explosion by lightning of the powder-magazine at Brescia.
- 446a.—Further observations upon lightning together with some experiments. vii+26 pp. 4to. *London, for Lockyer Davis. London, 1774*
 The author advocates strong anti-Franklinian views.
 —See also 334.
447. **Lovett**, R(ichard). (1692-1780.) The electrical philosopher; containing a new system of physics founded upon the principle of an universal plenum of elementary fire, offered by way of Supplement to the Philosophical Essays by the same author. To which is subjoined a postscript containing strictures upon the animadversions of the Monthly Reviewer on the Essays. 1 l.+290 pp.+10 l. 2 plates. 8vo. *Worcester, for the author. Worcester, 1774*
 Work of interest and speculation on motion, the tides, cohesion and gravity together with contemporary views on electricity and magnetism. Remarks on Symmer's experiments with silk stockings; singular electrical effects obtained by Bridone.
- 447a.—Second edition. 13 l.+290 pp.+10 l. 2 plates. 8vo. *Worcester, for the author. Worcester, 1777*
 —See also 391.

PLATE 1.



443. NAIRNE. (Reduced.)

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448. **s'Gravesande**, G(uillaume) J(acob). (Willem Jakob Storm van.) (1688-1742.) *Oeuvres philosophiques et mathématiques rassemblées et publiées par Jean Nic. Seb. Allamand, qui y a ajouté l'histoire de la vie et des écrits de l'auteur.* 2 vols. 29 plates. 4to. Amsterdam, Marc Rey. *Amsterdam, 1774*
Tracts on perspective, logic, metaphysics with sketch of the life of the eminent Dutch physicist and philosopher.
—See also 252.
449. **Toaldo**, Giuseppe. (1719-1797.) *Dell'uso de' conduttori metallici a preservazione degli edifizii contro de' fulmini, nuova apologia colla descrizione del conduttore della pubblica specola di Padova.* xxxii pp. 1 plate. 4to. Venezia, Antonio Zatta. *Venice, 1774*
Construction of lightning-conductors; also Franklin's letter to de Saussure, 1772. Toaldo held strong Franklinian views and urged the adoption of lightning-conductors for the protection of the public buildings of Venice.
- 449a.—*Mémoires sur les conducteurs pour préserver les edifices de la foudre. Traduits de l'Italien avec des notes et des additions par Mr. Barbier de Tinan.* x+242 pp. pl. 8vo. Strasbourg, Heitz. *Strasbourg, 1779*
The author was an earnest advocate for the general use of lightning rods. General considerations on them; views of M. de Saussure of Geneva; description of the lightning-conductors of St. Marc's, Venice; committee on the protection of the powder magazines at Purfleet. Toaldo was appointed to the chair of Astronomy at Padua in 1762.
450. **Beccaria**, Giacomo Battista. (1716-1781.) *Della elettricità terrestre atmosferica a cielo sereno osservazioni. (Dedicate a S. A. R. il Principe di Piemonte.)* 54 pp. 4to. *(Turin, 1775)*
This is the author's famous tract on the normal electricity of the atmosphere. Positive and negative electricity found, p. 4; observations on the electrical charges of clouds, p. 18; origin of atmospheric electricity, p. 32. (See Nos. 392bis, 435bis, 457.)
—See also 375.
451. **F(olie)**, D. L. (also Follie). (1733-1780.) *Le philosophe sans prétention ou l'homme rare. Ouvrage physique, chimique, politique et moral, par (M. D(e) L(a) F. C-L. de la Folie, négociant).* 349 pp. 1 plate. 8vo. Paris, Clousier. *Paris, 1775*
Work of pure imagination: fanciful form of electrical machine, p. 8; pressure due to impact of light, p. 31; smoke driven down chimney by pressure due to light, p. 129.
452. **Kies**, Johann. (1713-1781.) *De effectibus electricitatis in quaedam corpora organica.* 36 pp. 4to. Tuebingae, litteris Sigmundianis. (Inaugural dissertation.) *Tubingen, 1775*
Electricity developed in processes of vegetation.
453. **Priestley**, Joseph. (1733-1804.) *History and present state of electricity with original experiments.* Fourth edition, corrected and enlarged. xxxii+691 pp.+6 l. 8 plates. 4to. London, for C. Bathurst. *London, 1775*
This is the first extensive history of electrical discovery and theory; it is a storehouse of information; first edition, 1767. (See Nos. 508, 581.)

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ILLUSTRATED WITH CUTS.

IN TWO VOLUMES.

VOL. I.

By OLIVER GOLDSMITH, M. B.

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MDCCLXXVI.

458. GOLDSMITH.

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- 453a.——Additions to the history and present state of electricity, with original experiments. Second edition. iv+52 pp. 4to. London, for J. Johnson. *London, 1772*
Remarks on the electrical work of the author's immediate predecessors and contemporaries together with researches of his own, especially on the energy of discharge of Leyden batteries.
- 453b.—(French translation.) Histoire de l'électricité; traduite de l'anglois avec des notes critiques. 3 vols. 9 plates. 12mo. Paris, Herissant. *Paris, 1771*
The foot-notes of the translator are numerous and anti-Franklinian in substance.
—See also 422.
454. Pringle, (Sir) John. (1707–1782.) Discourse on the torpedo; delivered at the anniversary of the Royal Society, Nov. 30, 1774. 32 pp. 4to. *London, 1775*
The torpedo (electrical fish) considered historically and electrically.
455. Sigaud de la Fond, (Jean René). (1740–1810.) Description et usage d'un cabinet de physique expérimentale. 2 vols. 51 plates. 8 vo. Paris, Gueffier. *Paris, 1775*
Vol. i. Experiments in general physics; vol. ii. Experiments in electricity and magnetism, with numerous illustrations. (See No. 543bis.)
—See also 434.
456. (Simmons, John). (— — —) An essay on the cause of lightning and the manner by which the thunder-clouds become possessed of their electricity; to which are added, Plain directions for constructing and erecting safe conductors. 81 pp. 8vo. Rochester, T. Fisher. *Rochester, 1775*
The author condemns existing theories and propounds his own, *vis.*, that the electrification of clouds is due to attrition (friction), and that the discharge is always from the clouds down to the earth and never *vice versa*. Fifty pages are devoted to the erection and maintenance of lightning conductors.
457. Beccaria, Giacomo Battista. (1716–1781.) Treatise upon artificial electricity, in which are given solutions of a number of interesting electric phenomena, hitherto unexplained; to which is added, An essay on the mild and slow electricity which prevails in the atmosphere during serene weather. iv +457 pp. 11 plates. 4to. London, for J. Nourse. *London, 1776*
General treatise of considerable merit on electricity; also three letters on the electricity of the atmosphere in clear, serene weather. (See No. 392bis, 435bis, 450.)
—See also 375.
458. Goldsmith, Oliver. (1728–1774.) Survey of experimental philosophy considered in its present state of improvement. 2 vols. ill. 8vo. London, for T. Carnan and F. Newbery jun. *London, 1776*
Magnetism and electricity written for the general reader by the versatile Irish poet and naturalist.
459. Le Monnier, Pierre Charles. (1715–1799.) Lois du magnétisme, comparées aux observations et aux expériences, dans les dif-

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férentes parties du globe terrestre, pour perfectionner la théorie générale de l'aimant et indiquer par les courbes magnétiques, qu'on cherche à la mer sur les cartes reduites. Seconde partie, qui contient les nouvelles recherches sur la situation géographique de l'équateur et des pôles de l'aimant, avec l'art de faire les boussoles. 168+40 pp. 3 maps, 1 plate. 8vo. Paris, Imprimerie Royale. *Paris, 1776-1778*

Inquiry into the distribution of the earth's magnetic lines together with a discussion of the theory of two and of four centers of magnetic force. The work contains considerable magnetic data. Le Monnier was an eminent astronomer and physicist.

460. Schinz, Salomon. (1734-1784.) *A Σ Specimen physicum de electricitate.* 38 pp. 4to. Turici, ex officina Gessneriana. (Inaugural dissertation.) *Zurich, 1776*

Doctor's thesis on electric attraction; atmospheric electricity, electric theories. *Von Kleist* credited with the discovery of the jar condenser, p. 10; *de Romas* and the lightning kite, p. 19.

461. Marum, Martin van. (1750-1837.) *Verhandeling over het electrizeeren, in welke de beschryving en afbeelding van ene nieuw uitgevondene electrizeer-machine benevens enige nieuwe proeven uitgedagt en in't werk gesteld door den Auteur, en Gerhard Kuyper.* xiv+96 pp. 2 plates. 8vo. Groningen & Amsterdam, Yntema en Tieboel

Groningen & Amsterdam, 1776

General treatise on electricity; electric amalgam, p. 17; new electrical machine, p. 25.

—See also 532, 560, 572, 587, 761, 2521.

462. Della Maniera di preservare gli edifizii dal fulmine. 22 pp. 12mo. Milano, G. Galeazzi. *Milan, 1776*

Franklin's experiments on atmospheric electricity; use of lightning conductors.

463. Cavallo, Tiberio. (1749-1809.) *Complete treatise of electricity in theory and practice with original experiments.* xvi+viii+412 pp. 3 plates. 8vo. London, for E. and C. Dilly.

London, 1777

Original work on electricity. Electrified tourmaline, p. 25; evaporation increased by electrification, p. 65; fogs and snow electrified, p. 72; lightning conductors for buildings and ships, p. 80; jar with movable coatings, p. 325; results of experiments with kites, p. 366 and with pointed conductors, p. 370; portable electroscope, p. 377. Contains extracts from the *Epistola of Petrus Peregrinus*. Cavallo, a London physicist of considerable ability was of Italian origin. (See No. 46.)

- 463a.—Fourth edition. Containing the practice of medical electricity, besides other additions and alterations. 3 vols. (Vol. iii. containing the discoveries since the third edition.) 6 plates, 8vo. London, for Dilly. *London, 1795*

—See also 489, 528, 540, 648, 2471.

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464. **Chigi, Alessandro.** (— - — .) Lettera ad un amico sopra il fulmine caduto nel di 18 Aprile del corrente anno 1777 nella spranga posta nella torre del Palazzo pubblico della città di Siena. 16 pp. 8vo. Siena, Luigi e Benedetto Bindi.
Siena, 1777
Protection of public buildings against lightning recommended.
465. **Kirby, Thomas.** (— - — .) Analysis of the electrical fire, setting forth from the lecturer's own experiments, that it neither attracts, nor repels; nor is attracted, or repell'd, by points; or, any other way, is not material nor inherent, in bodies nor in the clouds, etc.; together with an account of an uncommon effect of lightning and dissertation on the thunder clouds. xii+24 pp. 8vo. (Chatham), for the author.
(Chatham, 1777)
Fire and electricity are not material, p. 11; action of points on the "electric fire," p. 13; curious effect of lightning, p. 16; fireball, p. 19.
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London, 1777
This biographical chart is a literary curiosity. The first edition appeared in 1765.
—See also 422.
467. **Strong, Adam.** (pseud.) The electrical eel; or, *Gymnotus electricus* by A. S. Naturalist. 111+19 pp. 4to. London, for J. Bew.
London, 1777
An electrical poem of little merit.
468. **The serpent's reply to the electrical eel.** 22 pp. 4to. London, for Smith.
London, 1777
Poem of doubtful electrical value.
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Edinburgh, 1778
Chapter xlii. treats of the various branches of science in a general way. The author was a philosophical and political writer of note in his day. The French edition is translated from the Italian by A. Morellet.
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Leyden, 1778
Effect of moisture and various acids on magnets, p. 35; *diamagnetic* quality of bismuth, discovered by author, p. 131.
—See also 414.

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Critical study of some of van Musschenbroek's magnetic experiments; inquiry into the nature of magnetic attraction. The author was an original investigator of note.
—See also 419.
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Munich, 1778
Description of the author's *linen* electrophorus.
—See also 486, 538, 732.

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The author was member of the committee appointed in 1772 to report on the best means of protecting the Purfleet powder-magazine against lightning. He reported against pointed conductors. In 1777 he undertook the experimental investigation here detailed from which he inferred the correctness of his earlier views, p. 56.
—See also 334.
- 479†. Bergman, Torbern Olof. (1735-1784.) Opuscula physica et chemica, pleraque antea seorsim edita, jam ab auctore collecta, revisa et aucta. Vols. i. to iv. plates. 12mo. Holmiae; Upsaliae, J. Edman; Lipsiae, J. M. Mueller. *Stockholm, Upsala, Leipzig, 1779-1787*
Work on chemistry famous in its time. The author was a Swedish chemist of distinction. The work is complete in six volumes; vols. iv to vi were edited after the author's death by Ernest Hebenstreit. Vol. vi contains a full index.
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Paper on pointed conductors read before the Purfleet Committee, 1772; also conjectures on the nature of the aurora borealis with illustrations. This collection was edited by Benjamin Vaughan who, for many years, was an intimate friend and correspondent of Franklin.
—See also 367.
482. Lichtenberg, Geo(rg) Christ(oph). (1741-1799.) De nova methodo naturam ac motum fluidi electrici investigandi. Commentatio prior. pp. 168-180. 3 plates. Commentatio posterior. pp. 65-79. 2 plates. 4to. (Commentationes Soc. Reg. Sci. Goettingensis.) *(Gottingen, 1779)*
This work describes the author's discovery of the double electrophorus (i. e., positive and negative electrification existing in juxtaposition); experiments on *cust figures* with numerous illustrations, p. 176.
483. Marat, (Jean Paul). (1744-1793.) Découvertes sur le feu, l'électricité et la lumière, constatées par une suite d'expériences

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nouvelles. Seconde édition. 3 l.+38 pp. 8vo. Paris, De Clousier. Paris, 1779

Series of 120 experiments, mostly on the properties of flame. The author, the notorious demagogue of the French Revolution, was a physicist of some ability, but characteristically bitter in his attacks on theories that did not agree with his own. The other scientific writings of Marat are as follows: *Recherches physiques sur l'électricité* (see No. 509). *Mémoire sur l'électricité médicale* (see No. 524). *Recherches physiques sur le feu* (202 pp., 1780); *Découvertes sur la lumière* (141 pp., 1780); *Notions élémentaires d'Optique* (44 pp., 1784); . . . *Les aéroplanes et l'aérostation* (39 pp., 1785); *Optique de Newton, traduction nouvelle* (2 vols., 192+308 pp., 1787); *Nouvelles découvertes sur la lumière* (324 pp., 1780). From 1765 to 1777 Marat lived in England, where he published *An essay on the human soul* (1772); *A philosophical essay on man* (1773); *The chains of slavery* (259 pp., 4to, 1774), and two essays on medical subjects (both 1775) also written in English. In 1775 the University of St. Andrews conferred on Marat the degree of Doctor of Medicine. The numerous books he published prior to the French Revolution were presumably all printed at the author's expense, thus indicating that his income as a physician was considerable.

—See also 509, 524.

484. Nairne, Edward. (1726-1806.) Experiments on electricity, being an attempt to shew the advantage of elevated pointed conductors. Read at the Royal Society, June 18th and 25th, 1778. 40 pp. 4 plates. 4to. London, J. Nichols. London, 1779

This pamphlet is one of several that were occasioned by the famous controversy of *Points vs. Knobs* begun in 1772 by Benjamin Wilson. Franklin's views were supported by Cavendish and finally adopted.

—See also 443.

485. Stanhope, Charles Viscount Mahon. (Third Earl). (1753-1816.) Principles of electricity, containing divers new theorems and experiments, together with an analysis of the superior advantages of high and pointed conductors. xiv+263 pp. 6 plates. 4to. London, for P. Elmsley. London, 1779

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- 485a.— (French translation.) Principes d'électricité, contenant plusieurs théorèmes appuyés par des expériences nouvelles, traduit par l'abbé N. - - - (Needham). 3 l.+250 pp. pls. Londres & Bruxelles, Flon. London, Brussels, 1781

486. Weber, Joseph. (1753-1831.) Beschreibung des Luftelektrophors. 86 pp. 12mo. Augsburg, Klett. Augsburg, 1779

Description of his important linen electrophorus together with numerous experiments which were made with it.

—See also 477.

- 487†. Wiegleb, Johann Christian. (1732-1801.) Die natuerliche Magie aus allerhand belustigenden und nuetzlichen Kunststuecken bestehend. iv+416 pp.+5 l. 9 plates. 8vo. Berlin, Nicolai. Berlin, 1779

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Medical applications of the "electric shock."
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Franklin's theory of the Leyden jar disproved, ch. vi.; also numerous experiments tending to prove the correctness of the author's views.
—See also 571.
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The electricity of clouds; protection afforded by lightning-rods. The author holds to the Franklinian theory.
496. **Swinden, Jan Hendrik van.** (1746–1823.) Dissertatio de analogia electricitatis et magnetismi. (Neue Philos. Abhandl. d. Baier. Akad. d. Wiss. Vol. ii., pp. 1–126.) 2 plates. 4to. Muenchen. *Munich, 1780*
Thesis on the analogy between the nature and phenomena of electricity with those of magnetism. (See Nos. 492, 494, 496a.)
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Work of considerable originality in which the laws and phenomena of magnetism and electricity are compared in detail, theories discussed and the views of *Mesmer* on animal magnetism criticized. The collection comprises the following titles: 1. Van Swinden's prize-essay on the analogy between electricity and magnetism. 2. Steiglehner's prize-essay on the analogy between electricity and magnetism. 3. Aepinus' remarks on the above essays. 4. Huebner's prize-essay on the analogy between electricity and magnetism. 5. Mesmer's reflections on animal electricity. 7. Van Swinden's essay on the irregular movements of the magnetic needle.
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—See also 419.
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Slight references are made to lightning and the aurora borealis, p. 566.
—See also 406.

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Essai sur l'électricité naturelle et artificielle. 2 vols. 8vo.
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Text of the celebrated poem of *Guyot de Provins* on the magnet, written in
the 12th century. Vol. ii., p. 185. (See No. 594.)

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perimenta circa electricitatem. 36 pp. 4to. Duisburgi ad
Rh., Fr. Ad. Benthon. (Inaugural dissertation.)

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Views on electrical theory.

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- 505a. — Seconde édition. xvi pp.+2 l.+624 pp.+2 l. 10 plates. 8vo.
Paris, rue et hotel Serpente. Paris, 1785

—See also 434.

506. **T(houvenel, Pierre)**. (1747–1815.) Mémoire physique et
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Description of experiments common at the time in static electricity; aurora borealis, Part II, p. 43; a new electrical machine, Part III. One of the first, co-operating with Van Troostwijk, to decompose binary compounds.

—See also 681.

508. Hooper, W(illiam). (fl. 1770.) Rational recreations, in which the principles of numbers and natural philosophy are clearly and copiously elucidated, by a series of easy, entertaining, interesting experiments. Among which are all those commonly performed with cards. By W. Hooper. Second edition. 4 vols. 65 plates. 8vo. London, for L. Davis.

London, 1782-1783

Chiefly a compilation from writers on recreative philosophy. The electrical experiments described in vol. iii. are mostly from Priestley's "History of Electricity." (See No. 453.) Plate i. gives an illustration of Priestley's machine which was occasionally turned by a *windmill* placed on the top of the house, p. 16. The first edition appeared in 1774.

509. Marat, (Jean Paul). (1743-1793.) Recherches physiques sur l'électricité. viii+461 pp. 5 plates. 8vo. Paris, de l'Imprimerie de Clousier.

Paris, 1782

Accepted theories are attacked and 214 experiments described which are held to prove the author's own theories. Many complimentary references are, however, made to Franklin.

—See also 483.

510. Nicholson, William. (1755-1815.) An introduction to natural philosophy. Illustrated with copper plates. 2 vols. 25 plates. 8vo. London, for J. Johnson.

London, 1782

Vol. ii. contains chapters on magnetism and electricity.

—See also 699, 2490.

511. New thoughts on medical electricity; or, An attempt to discover the real uses of electricity in medicine, in two letters to a friend. 48 pp. 8vo. Sevenoaks, Clout, jr.

Sevenoaks, 1782

Remarkable cures effected by electricity; effects of electrification on the human system.

- 511bis. Volta, A(lessandro). (1745-1827.) Del modo di render sensibilissima la piu debole elettricità sia naturale, sia artificiale. (Philos. Trans. Roy. Soc., Vol. 71, pp. 237-280.) 4to.

London, 1782

Description of the author's *condensing electroscope*.

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- 511bis a.—(English translation.) Of the method of rendering very sensible the weakest natural or artificial electricity. (Philos. Trans. Roy. Soc., Vol. 72, pp. vii—xxxiii.) 4to London, 1782
—See also 428.
512. Behn, Friedrich Daniel. (1734-1804.) Beschreibung einiger merkwuerdigen Nordlichter. 127 pp. 12mo. Luebeck, C. G. Donatus. Lubeck, 1783
The aurora borealis as seen by the author. The appendix has observations on the solar eclipse of 1764, and the transit of Venus of 1769.
- 512†bis. Bertholon, (Nicole). (1742-1800.) De l'électricité des Végétaux . . . Avec des figures en taille-douce. 468 pp., 3 plates. 8vo. Lyon, chez Bernuset. Lyons, 1783
The author states that this work may be regarded as a continuation of his *De l'électricité du corps humain* (see No. 533). Experiments to determine the effect of static electricity on the growth of plants are described.
—See also 533, 539.
513. Blagden, (Sir) C(harles) (1748-1820.) and E(dward) Nairne. (1726-1806.) Proceedings relative to the accident by lightning at Heckingham. 26 pp. 6 plates. 4to. London, Nichols. London, 1783
The building referred to had eight pointed conductors; the views show the conductors (full size) and the manner in which they were joined together.
—See also 443.
514. Indagine, (Innocentius Libertus ab) pseud. (i.e. Johann Ludolph Jaeger). (1728?-1787.) Philosophisch—und physikalischer Zeitvertreib in einigen sonderbaren Materien, zu weiterer Betrachtung in den Nebenstunden, fuer die Naturforscher ausgefertigt und ans Licht gestellet von dem Naturkundiger. 308 pp. 12mo. Nuernberg, J. A. Stein. Nuremberg, 1783
Recreative philosophy; electric experiments, pp. 100-124; magnetic experiments, pp. 129-168.
515. Kuehn, Carl Gottlob. (1754-1840.) Geschichte der medizinischen und physikalischen Electricitaet, und der neuesten Versuche, die in dieser Wissenschaft gemacht worden sind. 2 vols. 6 plates. 8vo. Leipzig, Weygand. Leipzig, 1783-1785
Principles of electricity; electrical machines; application for curative purposes. Franklin's theory of the Leyden-jar discussed at length; lightning-rods; atmospheric electricity. Vol. ii. is also known under the title: Versuch einer vollstaendigen Geschichte der medizinischen Electricitaet, oder von der Anwendung der Electricitaet auf die Heilkunde. In 1796-1797 a continuation appeared: Die neuesten Entdeckungen in der physikalischen und medizinischen Electricitaet.
516. Ledru, N(icolas) P(hilippe). (1731-1807.) Rapport de MM. Cosnier, Maloet, Darcet, Philip, Le Preux, Desessartz et Paulet. Sur les avantages reconnus de la nouvelle méthode d'administrer l'électricité dans les maladies nerveuses particulièrement dans l'épilepsie et dans la catalepsie, par M. Le-

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dru, dit Comus. Ce rapport est précédé de l'aperçu du système de l'auteur sur l'agent qu'il emploie et des avantages qu'il en a tirés. Imprimé par ordre et aux frais du gouvernement. 2 l.+115 pp. 8vo. Paris, C. D. Pierres.

Paris, 1783

Medical effects of electricity on nervous disorders as claimed by the author.

517. Milner, Thomas. (1719-1797.) Experiments and observations in electricity. xvi+111 pp. 2 plates. 8vo. London, for T. Cadell.

London, 1783

Peltier's electroscope anticipated, p. 35; Franklin's "ice-pail" experiment, p. 99; steel magnetized by lightning, p. 108. This is "one of the rarest electrical tracts, which I know of—and well worthy of perusal. I have met with only two copies after 38 years of diligent search." (Latimer Clark, July, 1888.)

518. Nairne, (Edward). (1726-1806.) The description and use of Nairne's patent electrical machine; with the addition of some philosophical experiments and medical observations. 62 pp. 5 plates. 8vo. London, for Nairne.

London, 1783

This machine, described in text-books, was originally designed for medical purposes.

- 518a.—Another edition. 68 pp. 5 plates. 8vo. London, for Nairne.

London, 1787

—See also 443.

- 519.* Adams, George (the younger). (1750-1795.) Essay on electricity, in which the theory and practice of that useful science are illustrated by a variety of experiments; to which is added an Essay on magnetism. xvi+367 pp. 6 plates. 8vo. London, for the author.

London, 1784

This is a collection of electrical experiments. The *double burr*, p. 119; sewing needle magnetized and magnet demagnetized by Leyden-jar discharge, p. 120; Wilcke's electrophorus of 1762, p. 170; Beccaria on atmospheric electricity, p. 205; Cavallo's atmospheric electroscope, p. 221.

- 519^a.—An essay on electricity, explaining the principles of that useful science; to which is added a letter to the author from John Birch on the subject of electricity. Fourth edition. xi+588 pp. 6 plates. 8vo. London.

London, 1792

Experiments bearing on all known electric phenomena with explanations according to current theories. Bennet's original *electroscope*; Nicholson's *doubler*; Volta's and Wilcke's electrophorus; medical electricity. The illustrations, 128 in number, are of interest.

- 519b.—Fifth edition, with corrections and additions by William Jones. xii+594 pp. 6 plates. London, W. & S. Jones.

London, 1799

520. Cassini, (Jean Dominique). (1748-1845.) Observations sur les variations diurnes de l'aiguille aimantée. (Lettre à l'auteur

CATALOGUE OF WHEELER GIFT

- du Journal de Physique.) 64 pp. 2 plates. 4to. Paris, L. P. Courset.
Paris, 1784
Detailed description of needles used for determining magnetic declination; declination in Paris from 1666, in which year it was zero. Cassini was one of the leading astronomers of his time.
521. **Coulomb**, (Charles Augustin.) (1736-1806.) *Recherches théoriques et expérimentales. Sur la force de torsion et sur l'électricité des fils métalliques.* (Mém. de l'Acad. Sci. pp. 229-269.) 2 plates. 4to. *Paris, 1784*
Classic paper by the eminent French engineer and physicist on the coefficient of torsion of wires, in which it is shown that the force of torsion is proportional to the angle of torsion.
See also 490.
- 522.† **Gardini**, Giuseppe Francesco. (1740-1816.) *De influxu electricitatis atmosphericae in vegetantia.* xviii+157 pp. 8vo. *Augustae Taurinorum. Turin, 1784*
Numerous observations on atmospheric electricity in its relation to the time of day and state of weather.
523. **Landriani**, Marsiglio. (? -1816?) *Dell' utilità dei conduttori elettrici.* Dissertazione. xxiv+304 pp. 1 plate. 8vo. *(Milan, 1784)*
Function of lightning conductors. Natural and artificial electricity, p. 11; Franklin's experiments, p. 43; construction of a lightning-rod, p. 78; objections answered; letters from de Saussure, Toaldo and others.
524. **(Marat, Jean Paul.)** (1744-1793.) *Mémoire sur l'électricité médicale.* 8+111 pp. 8vo. Paris, Méquignon. *Paris, 1784*
This is one of the early books on medical electricity. The author minutely describes a great number of applications that he made of positive and negative electricity on himself and others. He refers to persons killed by lightning and adds many curious observations on cats, dogs and pigeons which he electrocuted.
—See also 483.
525. **Tiraboschi**, G(irolamo). (1731-1794.) *Histoire de la littérature d'Italie tirée de l'Italien de Tiraboschi et abrégée par Antoine Landi.* 5 vols. 8vo. Berne, De Burne l'ainé. *Bern, 1784*
This translation is an abridgment of the great work of the Italian Jesuit and bibliographer on the literature of Italy; it contains many references to the history of the mariner's compass.
- 526.* **Mémoires** concernant diverses questions d'astronomie, de navigation et de physique. xvi+32 pp. plates. 4to. Paris. *Paris, 1784*
One of the papers contains observations on the accepted theory of winds; a second, observations on the annual change in magnetic declination made at Issy near Paris in 1779.
527. **Bruno de** (Introducteur des Ambassadeurs du Cte. d'Artois) (— —.) *Recherches sur la direction du fluide magnétique dédiés à Monsieur, frère du Roi.* viii. 206 pp. 8 plates. 12mo. Amsterdam, chez Gueffier. *Amsterdam, 1785*
An effort to show that the accepted theories in magnetism are untenable

R E C H E R C H E S

THÉORIQUES ET EXPÉRIMENTALES

Sur la force de torsion , & sur l'élasticité des fils de métal : Application de cette théorie à l'emploi des métaux dans les Arts & dans différentes expériences de Physique : Construction de différentes balances de torsion , pour mesurer les plus petits degrés de force. Observations sur les loix de l'élasticité & de la cohérence.

Par M. C O U L O M B.

I.

CE Mémoire a deux objets ; le premier , de déterminer la force élastique de torsion des fils de fer & de laiton , relativement à leur longueur , à leur grosseur , & à leur degré de tension. J'avois déjà eu besoin , dans un Mémoire sur les Aiguilles aimantées , imprimé dans le neuvième volume des *Savans étrangers* , de déterminer la force de torsion des cheveux & des soies ; mais je ne m'étois point occupé des fils de métal , parce que l'objet utile à mes recherches , n'étoit pour lors que de choisir , à forces égales , les suspensions les plus flexibles , & que j'avois trouvé que les fils de soie avoient incomparablement plus de flexibilité que les fils de métal. Le second objet de ce Mémoire , est d'évaluer l'imperfection de la réaction élastique des fils de métal , & d'examiner quelles sont les conséquences que l'on en peut tirer , relativement aux loix de la cohérence & de l'élasticité des corps.

521. COULOMB. (Reduced.)

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because based on erroneous or faulty experiments. There is but one universal fluid (*the ether*) susceptible of modification, it suffices to explain all natural phenomena, p. 196. The diagrams of the magnetic field are worthy of notice.

528. **Cavallo**, (Tiberio). (1749-1809.) Magnetical experiments and observations. (Phil. Trans. Roy. Soc., Vol. 72, pp. 62-80.) 4to.

London, 1785

The Bakerian lecture, 1785 (founded by Henry Baker, Esq.) The author finds that *brass* "which is often magnetic does not owe its magnetism to iron but to some particular configuration of its component particles, occasioned by the usual method of hardening it, which is by hammering."—See also 463.

529. **Franklin**, Benjamin. (1706-1790), and others. Report of Dr. Benjamin Franklin, and other Commissioners, charged by the King of France, with the examination of the Animal Magnetism as now practiced at Paris. Translated from the French with an Historical Introduction. xx+108 pp. 12mo. London, for Johnson.

London, 1785

The Commissioners found that "the existence of the fluid (animal magnetism) is *absolutely destitute of proof*," p. 106.

—See also 367.

530. **Kratzer**, Joseph Anton, (1748-1796.) (also Krazer). Praktische Ausmessung und Berechnung der Felder auf eine sehr einfache und fassliche Art entworfen. 31 pp. tab. 12mo. Graz. Ferstl.

Graz, 1785

A short treatise on mensuration.

531. **M(ercier de St. Léger**, Barthélemi). (1734-1799.) Notice raisonnée des ouvrages de Gaspar Schott, contenant des observations curieuses sur la Physique expérimentale, l'Histoire naturelle et les arts par M. Abbé M - - - (Barthélemi Mercier). 108 pp. 12mo. Paris, chez Lagrange.

Paris, 1785

Reference is made, p. 28 to Porta's "*Magia Naturalis*"; (See No. 47); magnetic signaling is condemned as absurd, p. 128.

532. **Marum**, Martin van. (1750-1838.) Beschryving eener ongemeen groote electrizeer-machine, geplaatst en Tevler's Museum te Haarlem, en van de proefneemingen met dezelve in't werk gesteld. 2 vols. 17 plates. 4to. Haarlem, Joh. Enschede.

Harlem, 1785-1787

The author's great electrical machine described, p. 2; his mammoth Leyden battery, p. 154; deflagration of metals, p. 164; magnetizing effect of powerful discharges, p. 168. Contains some of the earliest experiments of the action of electric discharge on gases and of the electric smelting of metals. The book is in French and in Dutch; the plates are of interest.

—See also 461.

- 533.† **Bertholon**, (Nicole). (1742-1800.) De l'électricité du corps humain dans l'état de santé et de maladie. Ouvrage couronné par l'Académie de Lyon, dans lequel on traite de l'électricité de l'atmosphère, de son influence et des effets sur l'économie animale, des vertus médicales de l'électricité, des découvertes

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modernes, et des différentes méthodes d'électrisation; avec un grand nombre de figures en taille-douce. Second edition. 2 vols. 6 plates. 8vo. Paris, Croulbois. *Paris, 1786*

In this second edition of a work that interested scientific as well as medical men, there is much about atmospheric electricity and its effects on the human system; also applications of positive and negative electricity to the cure of diseases. Historical frictional machines, vol. ii., p. 214.

—See also 512bis.

534. **Bohnenberger**, Gottlieb Christian. (1732-1807.) Fortgesetzte Beschreibung einer sehr wirksamen Elektrisir-Maschine von ganz neuer Erfindung und einiger zur elektrischen Praxis gehoerigen Werkzeuge mit angehaengten Versuchen. 110 pp. 6 plates. 12mo. Stuttgart, bey Johann B. Mezler.

Stuttgart, 1786

Illustrated description of a new electrical machine with prime conductor carrying rows of points.

—See also 581.

535. **Elliot**, John. (1747-1787.) Elements of the branches of natural philosophy connected with medicine, viz. chemistry, optics, acoustics, hydrostatics, electricity, and physiology. Second edition. xvi+331 pp. 2 plates, 2 tables. 8vo. London, for J. Johnson.

London, 1786

A short chapter on electricity beginning p. 199.

536. **Silberschlag**, J(ohann) E(saias). (1721-1791.) Systema inclinationis et declinationis utriusque acus magneticae. (Mém. de l'Acad. d. Sc. Berlin, pp. 87-148.) 11 plates, 4to.

Berlin, 1786-1787

Remarks on the use of the dip and declination needles.

537. **Tressan**, (Louis Elisabeth de la Vergne). (1705-1783.) Essai sur le fluide électrique considéré comme agent universel. 2 vols. 12mo. Paris, chez Buisson.

Paris, 1786

Discursive work in which electricity is connected with the processes of the animal and vegetable worlds as well as with most natural phenomena from lightning and volcanic action to the aurora borealis and zodiacal light.

538. **Weber**, Joseph. (1753-1831.) Ueber den Werth der Luftmaschinen. 44 pp. 3 plates. 12mo. Dillingen & Ulm, Wohler.

Dillingen & Ulm, 1786

A discourse on the art of ballooning.

—See also 477.

- 539.* **Bertholon**, (Nicole). (1742-1800.) De l'électricité des météores. Ouvrage dans lequel on traite de l'électricité naturelle en général et des Météores en particulier. 2 vols. 6 plates. 8vo. Paris, chez Croulbois.

Paris, 1787

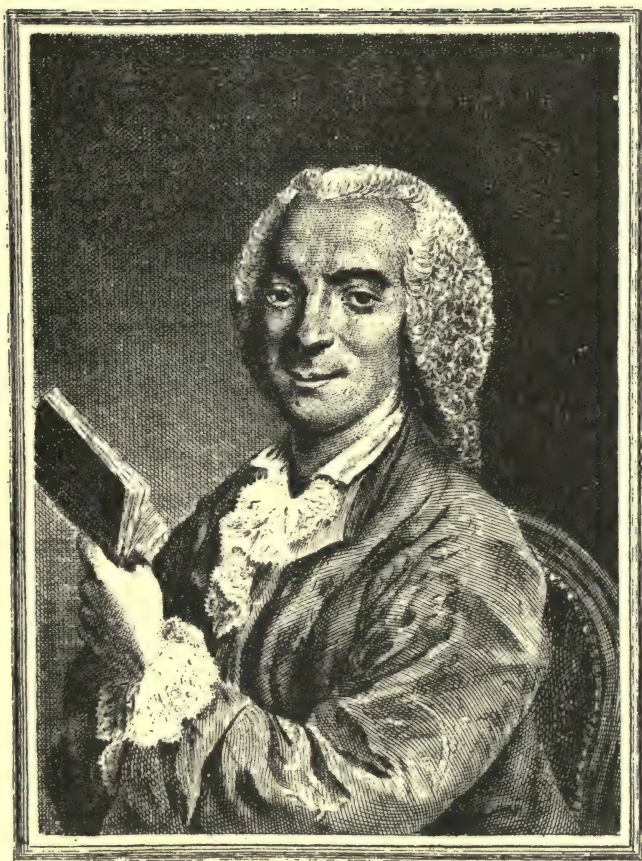
Natural phenomena connected with electricity including earthquakes, volcanoes, hail, and waterspouts. Efficacy of conductors with points and with knobs. Details of experiments by d'Alibard, de Romas, Beccaria and others. Pernicious practice of ringing bells on the approach of a storm,

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Vol. i., p. 170; cases of polarity-reversal of compass needles in a storm, vol. ii., p. 373.

—See also 512bis.

540. **Cavallo**, Tiberio. (1749-1809.) Treatise on magnetism in theory and practice, with original experiments. xii+343 pp. 2 plates. 8vo. London, for T. Cavallo. *London, 1787*
Discovery of the directive property of the magnet, p. 45; claims of the Chinese, p. 47; discovery of declination, p. 50; magnetic properties of brass, p. 283; of platinum, p. 300; of red-hot iron, p. 311; causes of magnetic declination, p. 324. (See No. 2645.)
- 540a.—Third edition, with a supplement. xi+325 pp. 3 plates. 8vo. London, Jones. *London, 1800*
The supplement contains the Latin text of parts of the letter of *Peregrinus* on the magnet, A. D. 1269, accompanied by a free translation. (See No. 46.)
- 540b.—(German translation). Theoretische praktische Abhandlung der Lehre vom Magnet. Aus dem Englischen. 206 pp. 2 plates. 8vo. Leipzig, Schwickert. *Leipzig, 1788*
—See also 463.
541. **Hauey**, René Just. (1743-1822.) Exposition raisonnée de la théorie de l'électricité et du magnétisme, d'après les principes de M. Aepinus. xxvii+238 pp. 4 plates. 8vo. Paris, chez la veuve Desaint. *Paris, 1787*
Work on electrical theory by Abbé Hauey, celebrated French mineralogist and physicist: he adopts the one-fluid theory as modified by Aepinus; Coulomb's torsion-balance to establish the laws of electric and magnetic attraction and repulsion, pp. 39, 184; electrification of tourmaline, ruby, topaz, p. 95; return shock, p. 105.
—See also 684.
542. **Kitz**, Friedrich Casimir. (— — —) Dissertatio sistens electricitatis in medicina usum et abusum. 92 pp. 12mo. Goettingae (Inaugural dissertation.) *Gottingen, 1787*
Dissertation on electric force, atmospheric electricity; medical applications of electricity, with *bibliography*.
543. **Lowndes**, Francis. (— — —) Observations on medical electricity containing a synopsis of all the diseases in which electricity has been recommended or applied with success; likewise pointing out a new and more efficacious method of applying this remedy by electric vibrations. 51 pp. 8vo. London, D. Stuart. *London, 1787*
Synopsis of complaints in which electrical application had been found to be of some advantage.
- 543† bis. **Sigaud de la Fond**, (Jean René). (1740-1810.) Éléments de physique théorique et expérimentale, pour servir de suite à la description & l'usage d'un cabinet de physique expérimentale. Seconde édition, revue et augmentée par M. Rouland. 4 vols. xxxii+635+567+576+622 pp., portrait, plates, 8vo. *Paris, 1787*
Electricity is treated in the second half of vol. iv. The work of which this is a continuation, *Description & usage d'un cabinet de physique*, was published in 1775. (See No. 455.)
—See also 434.



Naudin. Peint.

Coron. Sculp. 1787.

A. J. Sigaud de la Fond, ancien Professeur de Mathématiques, Démonstrateur de Physique expérimentale en l'Université, de la Société Royale des Sciences de Montpellier, des Académies de Petersbourg, d'Angers, de Bavière, de Valladolid, de Florence, &c. &c.

543+bis. SEGAUD DE LA FOND. Portrait of author.

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544. **Wakeley**, Andrew. (— — —.) The mariner's compass rectified with a description of the most useful instruments in practice in the art of navigation, also a table of latitude and longitude of places, enlarged by J. Atkinson, the whole revised by John Adams. 272 pp. 8vo. London, for Mount and Page. *London, 1787*
Detailed use of the compass in navigation; a handbook for seamen.
- 544a. — Another edition, with additions by J. Atkinson, the whole revised by John Adams. 279 pp. 12mo. London, for Mount and Davidson. *London, 1796*
545. **Drury**, O'Brien. (— — —.) Observations on the magnetic fluid. (Trans. Roy. Irish Acad., 1788, pp. 119-120.) 4to. *Dublin, 1788*
The author of the paper recommends covering compass-needles with a casing of thin, soft iron, the better to preserve their magnetism.
546. **Lo-Looz**, Robert de. (1730-1786.) Recherches sur les influences solaires et lunaires pour prouver le magnétisme universel. 4 parts. 7 plates. 8vo. Londres et Paris, Couturier. *Paris, 1788*
Work on cosmical magnetism in which the speculative element predominates.
547. **Prévost**, Pierre. (1751-1839.) De l'origine des forces magnétiques. xxiii+231 pp. 2 plates. 12mo. Genève, chez Barde. *Geneva, 1788*
Magnetism due to two fluids, which are self-repellent but mutually attractive. Terrestrial magnetism and the great central magnet, p. 200. The author of this work is the Swiss physicist to whom we are indebted for the "theory of exchanges" in heat, which bears his name.
—See also 2444.
548. **Ribright**, Thomas. (— — —.) Curious collection of experiments, to be performed on the electrical machines. Second edition enlarged and improved. 24 pp. 2 plates. 8vo. London, Steel. *London, 1788*
549. **Ussher**, H(enry). (1743-1790.) An account of an Aurora Borealis seen in full sunshine. (Trans. Roy. Irish Acad. vol. ii., pp. 189-191.) 4to. *Dublin, 1788*
Note on the connection between terrestrial magnetism and the aurora borealis.
550. — An account of some observations made with a view to ascertain whether magnifying power or aperture contributes most to the discerning small stars in the day. (Trans. Roy. Irish Acad. vol. i., pp. 37-42.) 4to. *Dublin, 1788*
551. **Troostwijk**, Adrian Paets van (1752-1837), and C(ornelius) R(udolph) T(heodor) **Van Krayenhoff**. (1758-1840.) De l'application de l'électricité à la physique et à la médecine. (Translated by Jan Hendrik van Swinden.) xii+319 pp. 4 plates. 4to. Amsterdam, chez D. F. Changuin. *Amsterdam, 1788*
This work written in 1786, is an inquiry into the nature of lightning, St.

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Elmo's fire, rain and fogs. The influence of electricity on vegetation is considered; also theory and application of electricity as used for medical purposes. Van Troostwijk was, according to Ostwald, the first to decompose with certainty a chemical compound electrically, in 1789.

552. **Bennet, A(braham).** (1750-1799.) New experiments on electricity, wherein the causes of thunder and lightning as well as the constant state of positive and negative electricity in the air or clouds are explained, with experiments on the clouds of powders and vapours artificially diffused in the air, also a description of a doubler of electricity, and of the most sensible electrometer yet constructed, with other new experiments and discoveries in the science, illustrated by explanatory plates. 141 pp. 4 plates. 8vo. Derby, J. Drewry. *Derby, 1789*
 Bennet's *electroscope*, p. 18; his *doubler*, p. 76; electricity of powders, p. 22; flames used for determining the electric condition of the atmosphere, pp. 77, 103; the aurora borealis stated to be an electrical phenomenon, p. 104.
 —See also 2483.

553. **Brook, A(braham).** (fl. 1789.) Miscellaneous experiments and remarks on electricity, the air-pump and the barometer; with the description of an electrometer of a new construction. xiii+211 pp. 2 plates. 4to. Norwich, for J. Johnson. *Norwich, 1789*
 Description of the author's electrometer for quantitative measurements; the fracture and repair of Leyden jars; paper and tinfoil used for coatings, p. 96; experiments made during an aurora borealis, p. 110.
 —See also 2480.

- 554.† **Calandrelli, Giuseppe.** (1749-1827.) Ragionamento sopra il conduttore elettrico quirinale. xxxvi pp. 12mo. Bologna. *Bologna, 1789*
 Construction and function of lightning conductors with numerous references: views of Franklin, Beccaria, Lord Mahon; Franklin's Lightning Kite experiment, June, 1752; that of de Romas, July, 1753.

555. **(Darwin, Erasmus).** (1731-1802.) The botanic garden, a poem in two parts; Part i. The economy of vegetation. Part ii. The loves of the plants. Third edition. 2 vols. 4to. London. *London, 1789-1795*
 This is the principal work of Darwin, poet and physiologist; it contains numerous footnotes having reference to electrical phenomena.
 —See also 621, 2456.

556. **Deiman, J(ohann) R(udolph).** (1743-1808.) Beschryving van eene electrizeer-machine. viii+93 pp. 2 plates. 4to. Amsterdam, W. Holtrop. *Amsterdam, 1789*
 Description of an electrical machine, with several pairs of plates.

557. **McCulloch, K(enneth).** (— — —) An account of the new improved sea compasses made by K. McCulloch. With reports of their practical utility founded on some years experience by (Captain) Philip d'Auvergne and other scientific gentlemen. 30 pp. 3 plates. 8vo. London, Carpenter. *London, 1789*
 Remarks on the steering and azimuth compasses.

558. **Meredith, Nicholas.** (— - — .) Considerations on the utility of conductors for lightning in which the nature and properties of the lightning are explained. viii+45 pp. 1 plate. 8vo. London, for the author. *London, 1789*
Usefulness of lightning conductors; action of points; fireballs, p. 14.
559. **Pascual, Antonio Raymundo.** (1708-1791.) Descubrimiento de la aguja nautica, de la situacion de la America, del arte de navegar, y de un nuevo metodo para el adelantamiento en las artes y ciencias. 320 pp. Sm. 4to. Madrid, Manuel Gonzales. *Madrid, 1789*
The author argues at length that Raymond Lully in 1272 discovered the *directive* power of the magnet and its use in navigation; also that Lully's reasons for believing in the existence of a Western continent were known to Columbus.
560. **Marum, Martin van.** (1750-1837.) Description des frottoirs électriques d'une nouvelle construction, dont l'effet surpasse de beaucoup celui des frottoirs ordinaires. (Lettre à M. le Chev. Marsilio Landriani). 8 pp. 4to. Haarlem. *Harlem, 1789*
A new form of rubber for frictional machines.
- 561.— **Nader bericht van Dr. van Marum, wegens zyne nieuwe elektrische wryvers.** (Algemene Konst-en Letter-Bode. Part ii., pp. 155-156.) 4to. *Harlem, 1789*
Letter in which the author's frictional machine is described.
—See also 461.
562. **Churchman, John.** (1753-1805.) Explanation of the magnetic atlas, or, variation chart, hereunto annexed, projected on a plan entirely new by which the magnetic variation on any part of the globe may be precisely determined for any time past, present, or future and the variation and latitude being accurately known, the longitude is of consequence truly determined. 46+5 pp. 2 tables. 8vo. Philadelphia, James & Johnson. *Philadelphia, 1790*
Causes of magnetic variation, p. 33. The tables give the position of the earth's magnetic poles for a period of 400 years. The appendix contains letters from Thomas Jefferson, and Sir Joseph Banks.
—See also 588.
563. **Fromery, Nic(olaus) Corn(elis) de.** (1770-1844.) De fulmine. 100 pp. 1 plate. 4to. Lugduni Batavorum, S. & J. Luchtmans. (Inaugural dissertation.) *Leyden, 1790*
Origin of atmospheric electricity: lightning, thunder, protection of houses; Franklin's electrical work appraised.
- 564†. **Guette, Johann Conrad.** (1747- ? .) Beschreibung verschiedener Elektrisirmaschinen zum Gebrauch fuer Schulen. xxxiv +312 pp. 11 plates. 12mo. Leipzig & Nuernberg, Schneider. *Leipzig & Nuremberg, 1790*
Short history of electricity with copious references and a bibliography.

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The whole work consists of three parts: Parts i. & ii. also known under the title: Beschreibung eines mathematischen und physikalischen Instrumenten-Kabinetts; and part iii., Beschreibung elektrischer Instrumente.

565. **Priestley**, Joseph. (1733-1804.) Experiments and observations on different kinds of air, and other branches of natural philosophy, connected with the subject. In three volumes, being the former six volumes abridged and methodized. With many additions. 3 vols. 9 plates. Birmingham, Thomas Pearson.
Birmingham, 1790

The discoveries described in this work established Priestley's reputation as a chemist and philosopher of eminence. The first edition, in three vols., appeared in 1774.

- 565a.— (French translation.) Expériences et observations sur différentes espèces d'air. Ouvrage traduit de l'anglois par (Jacques) Gibelin. 3 vols. 9 plates. 12mo. Paris, Nyon.
Paris, 1782-1783

—See also 422.

566. **Segnitz**, Friedrich Ludwig. (— — —) De electricitate animali quam dicere solent magnetismum animale. 34 pp. 4to. Jenae, typis Goepfertii. (Inaugural dissertation.) *Jena, 1790*
Dissertation on the curative power of electricity, followed by biographical notes of the author.

567. **Summary view** of the general principles of electricity. lxxvi pp. 1 plate. 8vo. (1790?)

The supplement contains an extract from de Saussure's observations on atmospheric electricity; also description of the famous Harlem frictional machine, and experiments on the electric light in vacuo by William Morgan.

568. **Boeckmann**, Johann Lorenz. (1741-1802.) Ueber die Blitzableiter. Eine Abhandlung auf hoechsten Befehl des Fuersten ausgearbeitet. 80 pp. 12mo. Carlsruhe, M. Macklot.
Carlsruhe, (1791)

Construction of lightning-rods: historical notes.

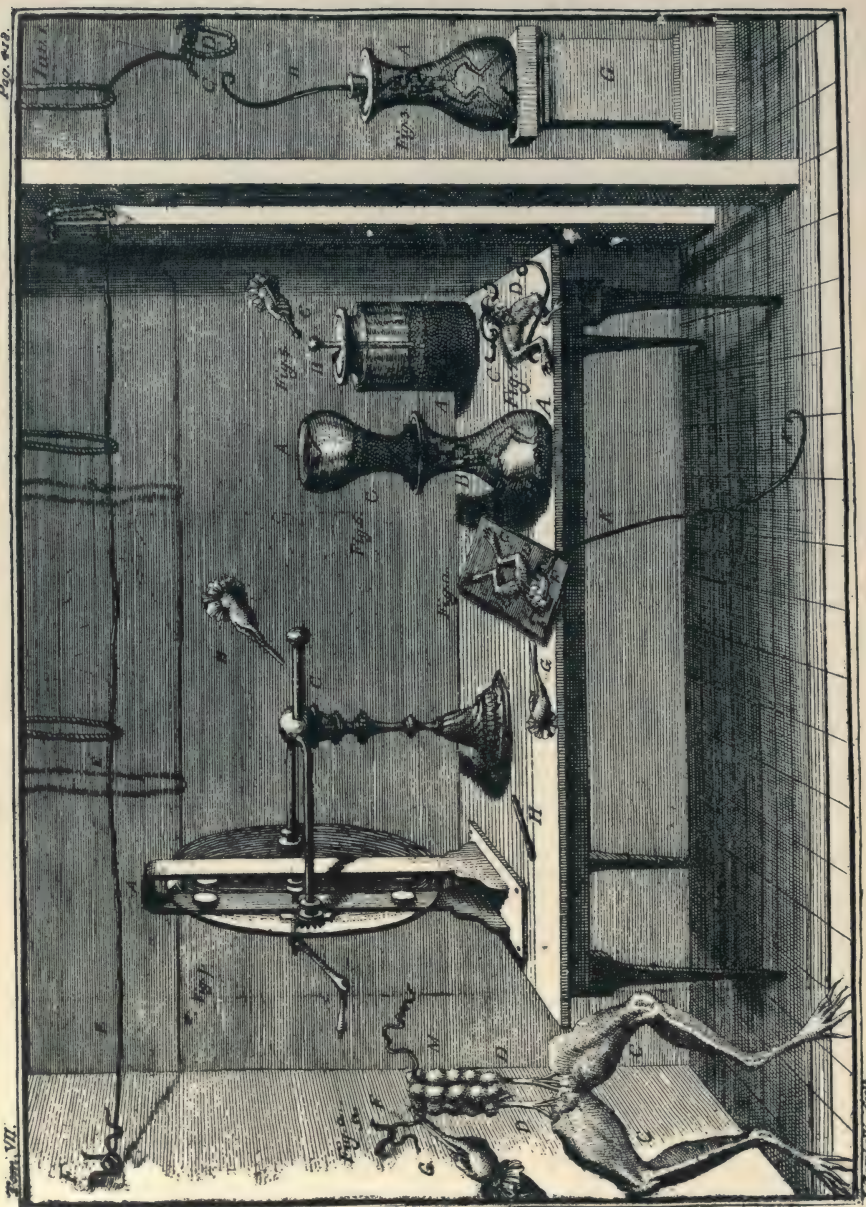
- 569.† **Condorcet**, Marie Jean Antoine Nicolas Caritat, Marquis de. (1734-1794.) Éloge de M. Franklin, lu à la séance publique de l'Académie des Sciences, le 13 Nov. 1790. 42 pp. 12mo. Paris, Pyre.
Paris, 1791
Appreciation of the character and work of Franklin by the celebrated French philosopher.

570. **Galvani**, Luigi. (1737-1798.) De viribus electricitatis in motu musculari, Commentarius. 58 pp. 4 plates. 4to. Bononiae, ex typographia Instituti Scientiarum. *Bologna, 1791*

First and very rare publication of Galvani on the electrical irritation of the nerves which led to the famous controversy between Galvani and Volta.

- 570a.— Another edition. Cum Aldini dissertatione et notis. Accesserunt epistolae ad animalis electricitatis theoriam pertinentes. xxv+80 pp. 3 plates. 4to. Mutinae, apud Societatem typographicam. *Modena, 1792*

Galvani's paper is preceded by Aldini's celebrated dissertation on animal electricity. (See Nos. 575, 577, 578.)



570. GALVANI. (Reduced.)

ALOYSII GALVANI

*In Bononiensi Archigymnasio, & Instituto Scientiarum
Publici Professoris, Anatomiçi Emeriti,
Academici Benedictini*


DE VIRIBUS ELECTRICITATIS IN MOTU MUSCULARI COMMENTARIUS

C U M

JOANNIS ALDINI

DISSERTATIONE ET NOTIS.

Accesserunt Epistolæ ad animalis electricitatis
theoriam pertinentes.



MUTINÆ MDCCXCII.

APUD SOCIETATEM TYPOGRAPHICAM.
Superiorum permissu.

575. ALDINI. (Reduced.)

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- 570b.— (German translation.) Abhandlung ueber die Kraefte der thierischen Electricitaet auf die Bewegung der Muskeln nebst einigen Schriften von H. H. Valli, Carminati und Volta ueber eben diesen Gegenstand. Uebersetzt und herausgegeben von D. Johann Mayer. xxviii+183 pp. 4 plates. 12mo. Prag, J. G. Calve.
Prague, 1793

—See also 575, 606, 999, 1798.

571. **Lyon, John.** (1734–1817.) Remarks on the leading proofs offered in favour of the Franklinian system of electricity, with experiments to shew the direction of the electric effluvia, visibly passing from what has been termed negatively electrified bodies. 47 pp. 3 plates. 8vo. London, J. Phillips.

London, 1791

The author controverts the Franklinian theory of the Leyden jar and holds that glass is permeable to electric effluvia; electricity of the atmosphere; *negative* electrification regarded as the more important; positive and negative brushes distinguished.

—See also 493.

572. **Marum, Martin van.** (1750–1837.) La description d'une machine électrique, construite d'une manière nouvelle et simple, et qui réunit plusieurs avantages sur la construction ordinaire. (Lettre à M. Jean Ingenhousz). 4 pp. 2 plates. 4to.

(Harlem), 1791

Illustrated description of the Harlem electrical machine.

- 573.— Lettre à M. Berthollet contenant la description d'un gazomètre, construit d'une manière différente de celui de Lavoisier & Meusnier et d'un appareil pour faire très exactement l'expérience de la composition de l'eau, par combustion continuelle, avec plus de facilité et moins de frais. 4 pp. 2 plates. 4to.

Harlem, 1791

Apparatus for the decomposition of water by means of heat.

—See also 461.

574. **Aberg, Ulrich Johann.** (— - —.) Comparatio inter vim magneticam, et electricam. 20 pp. 4to. Lundae, (Inaugural dissertation.)

Lund, 1792

Electric and magnetic "matter;" effect of polar aurorae on the compass-needle.

575. **Aldini, G(iovanni).** (1762–1834.) De animalis electricae theoriae ortu atque incrementis. xxvi pp. 4to. (Dissertatio.) Mutinae, apud Societatem typographicam.

Modena, 1792

Original work on animal electricity; Aldini upheld the views of Galvani, his uncle, on animal magnetism.

—See also 570a, 644, 660, 754.

576. **Birch, John.** (1745–1815.) Letter to Mr. George Adams on the subject of medical electricity. 57 pp. 8vo. London.

London, 1792

Account of experiments in medical electricity extending over twelve years;

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details of numerous cures. "I shall hope that an electrical machine may hereafter be considered an *instrument of surgery*," p. 57.
—See also 488.

- 577.† **Brugnatelli**, Luigi Valentino. (1761-1818.) *Memorie sull' elettricità animale inserite nel Giornale Fisico-medico del Sig. Brugnatelli.* 147 pp. 8vo. Pavia, B. Comini. *Pavia, 1792*
This volume contains a letter from Galvani on animal electricity and three memoirs by Volta on the same subject, all of which were published by Brugnatelli in his *Giornale "Fisico-Medico."* (See No. 570a.)
578. **Carminati**, Bassiano. (1750-1830.) *Lettera al Signor Luigi Galvani. (Sull' elettricità animale.)* (Aldini, "*De viribus electricitatis in motu musculari*," pp. 67-70). 4to. Mutinae, Comes. *Modena, 1792*
Carminati's letter is followed by an answer from Galvani. (See No. 575.)
579. **Robertson**, William. (1721-1793.) *Historical disquisition concerning the knowledge which the Ancients had of India; and the progress of trade with that country prior to the discovery of the passage to it by the Cape of Good Hope. With an appendix containing observations on the civil policy, the laws and judicial proceedings, the arts, the sciences and religious institutions of the Indians.* viii+366 pp. 2 maps. 12mo. Basile, Tourneisen. *Basle, 1792*
The Scotch historian gives on p. 228 reasons for believing that the compass was unknown to the Arabs and Chinese.
580. **Young**, A(rthur). (1741-1820.) *Travels during the years 1787, 1788, and 1789, undertaken more particularly with a view of ascertaining the cultivation, wealth, resources, and national prosperity of the Kingdom of France.* v+566 pp. maps. 4to. Bury St. Edmunds. J. Rackham. *Bury St. Edmunds, 1792*
Words transmitted *electrically* by means of *pith-balls*, p. 188.
- 580a.—(French translation.) *Voyages en France, pendant les années 1787, 1788, 1789 et 1790. Entrepris plus particulièrement pour s'assurer de l'état de l'agriculture, des richesses, des ressources et de la prospérité de cette nation. Traduit de l'Anglais par F. S(oulès) avec des notes et observations par M. Decasaux, et des cartes géographiques de la navigation et du climat.* 3 vols. maps. 8vo. Paris, Buisson. l'an ii. *Paris, 1793*
- 580b.—*Nouvelle traduction par Mr. Lesage, précédée d'une introduction par M. Léonée de Lavergne.* 2 vols. 1 map. 12mo. Paris, Guillaumin. *Paris, 1860*
581. **Bohnenberger**, G(ottlieb) C(hristian). (1732-1807.) *Beytraege zur theoretischen und praktischen Elektrizitaetslehre.* 2 parts. 2 plates. 8vo. Stuttgart. Metzler. *Stuttgart, 1793*
Part i. treats of the electric charges of clouds during thunderstorms, p. 73; Wilson's electrical machine, p. 96; Part ii. consists of remarks on Priestley's "*History of Electricity*." (See No. 453). The complete work comprises 5 parts, 1793-1795.
—See also 534.

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582. Dalton, John. (1766-1844.) Meteorological observations and essays. xvi+208 pp. 8vo. London, for W. Richardson.
London, 1793
Nature and cause of the aurora borealis by the celebrated author of the atomic theory of matter followed by a list of essays published by him.
- 582a.—Second edition. With appendix. xx+244 pp. 8vo. Manchester, Baldwin.
Manchester, 1884
—See also 2626.
583. Fowler, Richard. (1765-1863.) Experiments and observations relative to the influence lately discovered by M. Galvani and commonly called animal electricity. iii+176 pp. 8vo. Edinburgh, for T. Duncan.
Edinburgh, 1793
Professor Cotugno of Naples, in 1784 received a shock while dissecting a mouse, p. 2; Sulzer in 1767 experienced a peculiar taste when plates of lead and silver were placed above and below the tongue and connected at the outer end, p. 169; Professor Robison of Edinburgh made a *rouleau* of zinc plates and shilling pieces, p. 172, in the year 1793, seven years before the invention of the voltaic pile.
"I had a number of pieces of zinc made the size of a shilling and made them up into a rouleau with as many shillings. I find this alternation in some circumstances increases considerably the irritation. If the side of the rouleau be applied to the tongue so that all the pieces are touched by it, the irritation is very strong and disagreeable." p. 173.
584. Peart, Edward. (1756-1824.) On electric atmospheres, in which the absurdity of the doctrine of positive and negative electricity is proved, and the real nature, production, mode of existence and properties of atmospheres in an electric state, are clearly demonstrated and explained; to which is prefixed a letter addressed to Mr. Read of Knightsbridge, in reply to his Remarks on the author's former tract on electricity. xlv + 81 pp. 8vo. Gainsborough, for W. Miller.
Gainsborough, 1793
Belabored refutation of the doctrine of one homogenous, electric fluid.
585. Read, John. (— - — .) A summary view of the spontaneous electricity of the earth and atmosphere, wherein the cause of lightning and thunder, as well as the constant electrification of the clouds and vapours, suspended in the air, are explained. To which is subjoined the atmospherico-electrical journal, kept during two years as presented to and published by the Royal Society of London. viii+160 pp. 1 plate. 8vo. London, for the author.
London, 1793
Double *burr* produced by the spark discharge, p. 44; Canton's *silk rubber* coated with amalgam of mercury and tin, p. 89; journal relating to atmospheric electricity, p. 109. (See No. 584.)
—See also 2494.
586. Valli, Eusebio. (1755-1816.) Experiments on animal electricity with their application to physiology, and some pathological and medical observations. xvi+323 pp. 8vo. London, for J. Johnson.
London, 1793
Animal electricity and the nervous fluid are assumed to be one and the same.

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587. **Marum**, (Martin) van. (1750-1837.) Beandwoording der aanmerkingen von B. Tersier, betreffende het gebruik, van zuivere lucht en't warme bad, ter redding van Drenkelingen. 64 pp. 8vo. Haarlem, A. Loosjes. *Harlem, 1793*
 —Synthesis of water, p. 26.
 —See also 461.
588. **Churchman**, John. (1753-1805.) The magnetic atlas, or variation charts of the whole terraqueous globe, comprising a system of the variation and dip of the needle, by which the observations being truly made the longitude may be ascertained. 80 pp. 3 plates. 4to. London, for the author. *London, 1794*
 The introduction to the atlas contains a brief history of magnetic discovery. Aurora borealis, xxvii., aurora australis, xxviii.; age of the American continent, p. 58; magnetic charts.
- 588a. —Fourth edition. xviii.+86 pp. 3 maps. 4to. *London, 1804*
 —See also 562.
589. **Morgan**, G(eorge) C(adogan). (1754-1798.) Lectures on electricity. 2 vols. 2 plates. 12mo. Norwich, J. March. *Norwich, 1794*
 Striking distance and conducting terminals, vol. ii., p. 61; resistance of vacuum tubes, p. 171; origin of natural electricity, p. 303; effect of electricity on vegetation, p. 383; on animals, p. 394; construction of electrical apparatus, p. 439.
590. **Priestley**, Joseph. (1733-1804.) Heads of lectures on a course of experimental philosophy, particularly including chemistry, delivered at the New College in Hackney. xxviii+180 pp. 8vo. London, for Johnson. *London, 1794*
 Notes on electricity and magnetism.
 —See also 422.
591. **Reimarus**, J(ohann) A(lbert) H(einrich). (1729-1814.) Ausfuehrliche Vorschriften zur Blitz-Ableitung an allerley Gebauden. 46 pp. 2 plates. 8vo. Hamburg, C. E. Bohn. *Hamburg, 1794*
 Lightning-conductors for dwelling-houses, public buildings, and ships.
 —See also 474.
592. **Walker**, Ralph. (— - — .) Treatise on magnetism; with a description and explanation of a meridional and azimuth compass for ascertaining the quantity of variation, without any calculation whatever, at any time of the day; also improvements upon compasses in general with tables of variation for all latitudes and longitudes. 226 pp. 7 plates. 8vo. London, Hindmarsh. *London, 1794*
 Written for the use of the practical man. Magnetism is considered a fluid which pervades the globe, the atmosphere and the universe, p. 9; bundle of needles magnetized by a flash of lightning, p. 10; tables of declination and dip at various places and times.

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593. **Canali, Luigi.** (1759-1841.) Questions sur la loi découverte par Mr. Le Chevalier Volta relativement à l'électricité des vapeurs. (Mém. Acad. Sc. Turin, vol. vi., part 2, pp. 61-114). 4to.
Turin, 1795
The electricity of vapors, and associated atmospheric phenomena; Father Beccaria is frequently quoted.
594. **Lorimer, John.** (1732-1795.) Concise essay on magnetism with an account of the declination of the magnetic needle and an attempt to ascertain the cause of the variation thereof. xv+34+7 pp. 6 plates. portr. 4to. London, for the author.
London, 1795
Guyot de Provins and his poem on the magnet, 12th century; Peregrinus, A. D. 1269; also the Belgian plagiarist, Taisnier; Columbus and magnetic declination. (See No. 502.)
- 594a.—Second edition. 53 pp. 4 plates. 8vo. London, Jones.
London, 1800
—See also 2467.
595. **Young, (Sir) William.** (1st Bart.) (1749-1815.) Account of the Black Charaibs in the island of St. Vincent's; with the Charaib treaty of 1779 (or rather 1773), and other original documents. Compiled from the papers of the late Sir W. Y. (by Sir William Young, 2nd Bart.) 125 pp. 8vo. London, for Sewell.
London, 1795
596. **Entertaining extracts,** being a select collection from new books of merit. iv+248 pp. pls. Sm. 4to. Perth, for R. Morison.
Perth, 1795
Description of an optical and also of a mechanical telegraph, p. 30.
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London, 1796
This didactic poem contains a lengthy reference to sympathetic compasses. (See No. 3857.)
598. **Gregory, George.** (1754-1808.) The economy of nature explained and illustrated on the principles of modern philosophy. 3 vols. 46 plates. 8vo. London, for J. Johnson. *London, 1796*
General phenomena of electricity popularly treated, vol. i.; animal electricity, vol. iii.
—See also 767.
599. **(Harrington, Robert.)** (— — .) A new system on fire and planetary life; shewing that the sun and planets are inhabited, and that they enjoy the same temperament as our earth. Also an Elucidation of the phenomena of electricity and magnetism. iv+75 pp. 8 vo. London, Cadell. *London, 1796*
Remarks on electrical attraction and repulsion.
600. **Kirwan, Richard.** (1735-1812.) Thoughts on magnetism. 17 pp. 4to. Dublin, Bonhan. *Dublin, 1796*
Polarity due to orientation, p. 11; broken magnet, p. 11; magnetic screening, p. 12.

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601. **Moore, John Hamilton.** (? -1807.) The seaman's complete daily assistant, and new mariner's compass, being an easy method of keeping a journal at sea; to which is prefixed a short and easy treatise on arithmetic; to this edition is added The use of Hadley's quadrant, and Mercator's chart. Fifth edition. iv+48+56 pp. ill. maps. 8vo. London, for B. Law. *London, 1796*
Rules for finding the variation of the compass. The first edition appeared in 1779.
602. **Priestley, Joseph.** (1733-1804.) Experiments and observations relating to the analysis of atmospherical air; also farther experiments relating to the generation of air from water; to which are added Considerations on the doctrine of phlogiston, and the decomposition of water. 59 pp. 8vo. Philadelphia printed, London reprinted, for J. Johnson. *London, 1796*
—See also 422.
603. **Volta, Alessandro.** (1745-1827.) Schreiben an den Herrn Abt Anton Maria Vasali ueber die thierische Elektrizitaet als eine Fortsetzung der Schriften desselben ueber die thierische Elektrizitaet, herausgegeben von Dr. Johann Mayer. 77 pp. 12mo. Prag, Calve. *Prague, 1796*
The author denies Galvani's conclusions and affirms his own contact theory.
—See also 428.
604. **Watkins, J. (— — —) and W. Watkins.** (— . .) A short account of the azimuthal or invariable compass, wherein are mentioned how it was discovered; the private trials of it; its utility in navigation and surveying; with the best methods of proving its true and permanent polarity at sea and on land. 16 pp. 1 plate. 8vo. London, for J. and W. Watkins. *London, 1796*
It is here claimed that the compass-needle "indicates invariably and truly the four cardinal points of the horizon."
605. **Edgeworth, Richard Lovell.** (1744-1817.) A letter to the Earl of Charlemont on the tellograph and on the defence of Ireland. 54 pp. 8vo. *Dublin, 1797*
The *tellograph* was a mechanical device for the transmission of signals, see p. 5.
606. **Galvani, Luigi.** (1737-1798.) Memorie sulla elettricità animale al celebre Abbate Lazzaro Spallanzani, aggiunte alcune elettriche esperienze di Gio. Aldini. 105 pp. 2 plates. 4to. *Bologna, 1797*
Papers on electricity in which Galvani criticizes Volta's views, p. 1; states his own, p. 31; explains the function of the metallic arc-connection, p. 49.
—See also 570.
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adopted for the purpose of distant communication. 20 pp.
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Short essay on different modes of communication by signals from beacons down to telegraphs. "Fully as many objections will, I believe, operate against every mode of *electricity* being used as the vehicle of information," p. 10.

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Concise, explanatory description of compasses, parallel rulers and various scales.

—See also 327.

609. **Tremery**, (Jean Louis). (1773-1851.) Observations sur les aimans elliptiques proposés par M. Vassali. (Jour. des Mines, vol. ii., pp. 547-554). 12mo. *Paris, 1797*

Objections raised against Vassali's elliptical magnets.

610. **Coulomb**, (Charles Augustin). (1736-1806.) (Raphael) **Sabathier**, (Charles) **Pelletan** and others. Des premières expériences faites en floréal et prairial de l'an v, par la commission nommée pour examiner et vérifier les phénomènes du galvanisme. (Comptes rendus Instit. Nationale. Cl. Sc. Math. e Phys., 107 pp.) 4to. *Paris, 1798*

Results of experiments on frogs conducted by a commission of *savants* together with an inquiry into the effect of electric currents on the animal system; the existence of *animal electricity* denied.

—See also 490.

611. (**Gilly**, David (1748-1808) and Johann Albert **Eytelwein**.) (1764-1848.) Kurtze Anleitung auf welche Art Blitzableiter an den Gebaeuden anzubringen sind. 23 pp. 2 plates. 8vo. Berlin, Reimer. *Berlin, 1798*

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Method of Dr. Perkins, an American, for curing certain diseases by static electricity.

613. **Wilkinson**, C(harles) H(enry). (fl. 1800.) An essay on the Leyden phial ("with a view of explaining this remarkable phenomenon on pure mechanical principles") by which all the different appearances of electricity are more simply demonstrated; to which is added an Essay on medical electricity;

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Physiologically investigating the nature of those complaints, where the influence of this fluid may prove beneficial, illustrated with a variety of cases. vii+86+v+65 pp. 3 plates. 8vo. London, S. Low. *London, 1798*

The author assumes that electricity is a fluid which is subject to the same laws as ordinary matter. His theory of the Leyden jar, applying purely mechanical principles, p. 34.

—See also 619, 667.

614. **Arnim**, Ludwig Achim von. (1781–1831.) Versuch einer Theorie der elektrischen Erscheinungen. 146 pp. 1 plate. 12mo. Halle, J. J. Gebauer. *Halle, 1799*

Methods of electrifying bodies, p. 65; electric amalgams, p. 67; a new "electrometer," p. 124. —

615. (**Brès**, Honoré de.) (also de Brès, Onorato.) (— — —) Recherches historiques et politiques sur Malta, par O. B. 127 pp. 1 map, 2 plates. 12mo. Paris, Cramer. *Paris, 1799*
Notes on the conquest of Malta and on the agriculture and industries of the island.

616. **Humboldt**, Friedrich Heinrich Alexander von. (1769–1859.) Expériences sur le galvanisme, et en général sur l'irritation des fibres musculaires et nerveuses; traduction de l'Allemand par J. (Gravel) avec des additions par J. Fr. N. Jadelot. xlvii+530 pp. 8 plates. 8vo. Paris, Fuchs. *Paris, 1799*

After describing Cotugno's electro-physiological experiment, p. 26, the author discusses various galvanic phenomena and refutes Volta's theory, holding that the galvanic and the electric fluid are not identical.

—See also 663, 677, 1159.

617. (**Seiferheld**, Georg Heinrich). (1758–1818.) Sammlung elektrischer Spielwerke fuer junge Elektriker. 84 pp. 10 plates. 12mo. Nuernberg, Mohnath & K. *Nuremberg, 1799*
Electric toys. This collection consists of 10 parts, 1790–1808.

618. **Walker**, A(dam). (1731–1821.) System of familiar philosophy, in twelve lectures; containing the elements and the practical uses to be drawn from the chemical properties of matter, the principles and application of mechanics, of hydrostatics, of hydraulics, of pneumatics, of magnetism, of electricity, of optics, and of astronomy. xviii+571 pp. 47 plates. 4to. London, for the author. *London, 1799*

One lecture on magnetism and two on electricity. Lightning, electricity, light and fire are considered to be modifications of one common principle, p. 56; the whirl and orrery, p. 338; brush and star discharge, p. 346; Bennet's gold-leaf electroscope, p. 358; pointed rods and flames used to determine the electrification of the atmosphere, p. 356; thunderless lightning due to rarefied air, long vacuum tube, p. 390.

—See also 1192, 2522.

619. **Wilkinson**, C(harles) H(enry). (fl. 1800.) The effects of electricity in paralytic and rheumatic affections; to which are added Some observations on the inefficacy of metallic

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623. RIITTER. (*Reduced.*)

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tractors and An analysis of a course of lectures on experimental philosophy. 220 pp. 1 plate. 8vo. London, for Allen.

London, 1799

Essay on the medical effects of electricity with numerous examples of successful treatment. Lectures on mechanical philosophy, optics, sound and meteorology. Reference to electricity and the Leyden jar, p. 219.

—See also 613.

621. **Darwin**, Erasmus. (1731–1802.) *Phytologia; or, The philosophy of agriculture and gardening; with the theory of draining morasses, and with an improved construction of the drill plough.* viii+612 pp. pls. 4to. London, J. Johnson.

London, 1800

A few pages on the influence of electricity on vegetation.

—See also 555.

622. **Jones**, William. (1726–1800.) *Six letters on electricity.* 68 pp. 8vo. London, F. & C. Rivington.

London, 1800

General sketch of electricity with biographical notice of some pioneers; necessity of a medium, p. 44.

—See also 406.

623. **Ritter**, (J(ohann) W(ilhelm)). (1776–1810.) *Beytraege zur naechern Kenntniss des Galvanismus und der Resultate seiner Untersuchung.* Vol. i., parts 1–4. 4 plates. 8vo. Jena, Fr. Frommann.

Jena, 1800–1802

Inquiry into the nature of the electric current. This pamphlet contains the earliest account of the decomposition of water by the electric current. This gifted scholar confirmed the contact theory of the galvanic cell, which is treated, p. 278, part 2 and p. 141, Section 23, part 3; he also rendered important service in showing the relationship between chemical and galvanic phenomena, as well as in the discovery of the principles of the storage battery. Complete in 2 vols. or 8 parts, 1800–1805.

—See also 673.

624. **Signaux généraux de jour de nuit et de brume, à la voile et à l'ancre, à l'usage des armées navales de la République Française. 164 pp. tab. 4to.**

Paris, (1800)

Various modes of signaling at sea by day and by night as well as in cloudy and foggy weather.

625. **Augustin**, Fr(iedrich) Ludwig. (1776 – ?) *Vom Galvanismus und dessen medicinischer Anwendung.* 64 pp. 1 plate. 8vo. Berlin, Oehmigke, jr.

Berlin, 1801

Production of electric currents and their remedial uses.

626. **Chappe**, (Claude). (1763–1805.) *Beschreibung und Abbildung des Telegraphen; oder, Der neuerfundenen Fernschreibemaschine:* 16 pp. pl. 12mo.

Augsburg, 1801

Description of the author's mechanical telegraph.

627. **Cuvier**, (George Léopold) C(hrétien Frédéric Dagobert de.). (1739–1822.) *Sur le galvanisme.* (Journ. de Phys., Chem. et Hist. Nat. Vol. 52, pp. 318–321.) 4to.

Paris, 1801

Decomposition of water by the electric current.

—See also 702.

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Sketch of Porta's life (1540-1615), followed by an analysis of each of his important works.
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History of the various systems of mechanical transmission of signals.
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This important work is mainly the history of experimental investigations to determine the effect of the electric current on the animal system. Sue was an eminent surgeon.
- 630a.—Histoire complète du galvanisme, depuis sa découverte, jusqu'à ce jour, avec le détail des expériences faites et des écrites publiés sur ce phénomène. Second edition. 4 vols. 8vo. (See No. 2499.) *Paris, 1805*
—See also 651.
631. **Ulrich, Johann August David. (— — —)** De effectu galvanismi in aquam. 36 pp. 8vo. (Inaugural dissertation.) *Halle, 1801*
The electric decomposition of water; reference to Carlisle and Nicholson, Ritter and others.
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Critical examination of Galvani's electrical work and theory.
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Prizes founded by Napoleon I. for the advancement of electrical knowledge.
—See also 663, 734, 809, 2602.
- 633bis. **Birch, John. (1745-1815.)** An essay on the medical application of electricity. iv+57 pp. 8vo. *London, 1802*
—See also 488.
634. **Davy, (Sir) Humphry. (1778-1829.)** Syllabus of a course of lectures on chemistry delivered at the Royal Institution of Great Britain. 91 pp. 8vo. *London, 1802*
Outlines of lectures on electrical influence and on current electricity.
—See also 710, 829, 956, 2500.
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The letters were written for the instruction of the Princess of Anhalt-

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Dessau. There are 17 on magnetic and 16 on electrical subjects. The first edition appeared in 1795.

—See also 366.

- 636.* **Gale, T.** (— — .) *Electricity; or, Ethereal fire, considered 1st, naturally as the agent of animal and vegetable life. 2nd, astronomically, or as the agent of gravitation and motion. 3d, medically, or its artificial use in diseases. Comprehending both the theory and practice of medical electricity and demonstrated to be an infallible cure of fever, inflammation and many other diseases; constituting the best family physician ever extant.* 276 pp.+2 l. 12mo. *Troy, N. Y., 1802*

This book is among the first works on electricity printed in America. The author considers electricity to be the main cause of animal and vegetable life.

637. **Libes, A(ntoine).** (1752-1832.) *Traité élémentaire de physique, présenté dans un ordre nouveau d'après les découvertes modernes,* 3 vols. 30 plates. 8vo. An x. *Paris, 1802*

This third volume contains an elementary treatise on electricity, magnetism and "galvanism."

—See also 705.

638. **Negro, Salvatore dal.** (1768-1839.) *Dell' elettricismo idro-metallico.* 2 parts. 1 plate. 8vo. *Padova, 1802-1803*

Description of a voltaic pile consisting of 150 discs arranged in three "columns" connected in series; experiments made with it; static and current electricity compared; theory of the "pile."

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This is the great work of the English mathematician with copious notes added by the translator. (See Nos. 252, 260.)

—See also 250.

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The author disproves the electrical theory of Franklin as well as the *affluent* and *effluent* views of Abbé Nollet; experiments on static electricity; also on magnetism.

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—See also 686, 2546.
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—See also 463.
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Effect of the electric current on the animal system. (See No. 630.)
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Work of considerable fame, treating in detail of the effects of electricity on the human system.
—See also 434.
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—See also 575.
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—See also 704, 711, 2525.
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- 662a.—Treatise on subterraneous surveying and the variation of the magnetic needle. Second edition. 227 pp. 8 plates. 8vo.
Durham, 1822

—See also 5564.

663. Humboldt, Friedrich Heinrich Alexander von. (1769–1859) and Jean Baptiste Biot. (1774–1862.) Sur les variations du magnétisme terrestre à différentes latitudes. (Journ. Phys. Chim. et Hist. Natur. vol. 59, pp. 429–450). 1 table. 2 plates. 4to.

Paris, 1804

Magnetic observations made in America and in Europe. Biot's well-known hypothesis of a short central magnet to account for the phenomena of terrestrial magnetism, p. 14. (With Humboldt's autograph.)

—See also 616, 633.

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—See also 836.

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Volume i. is chiefly historical; vol. ii. treats of the method of producing the electric current and of its application to medical cases.

—See also 613.

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- 668.† **Rapport** fait à la classe des sciences mathématiques et physiques de l'Institut National, sur les expériences du citoyen Volta. (par (Jean Baptiste) Biot, (Pierre) de la Place, (Charles) Coulomb, (Jean) Halle, (Gaspard) Monge, (Antoine) Fourcroy, (Louis) Vauquelin, (Pierre) Pelletan, (Jacques) Charles, (Mathurin) Brisson, (Raphael) Sabathier, et (Louis) Guyton.) (Reprinted from *Mém. Inst. Paris*, vol. v.) 29 pp. 4to. *Paris*, 1804
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—See also 623.
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- 675a.—Complete works in philosophy, politics and morals; containing besides all the Writings published in former Collections, his diplomatic correspondence, as minister of the United States, at the Court of Versailles; a variety of literary and epistolary correspondence never before published with memoirs and anecdotes of his life. 6 vols. portr. 8vo.

Philadelphia, 1809-1818

Franklin's electrical work will be found in vol. iii.: "This edition was begun in 1808, but owing to the delay of Temple Franklin (with whom Duane agreed to an exchange of material), in printing his edition, it was not completed till 1818. The editor added many pieces to what had hitherto been printed as Franklin's, derived almost wholly from the books and MSS. which came into his possession by his marriage with the widow of Franklin Bache, but the work is so full of blunders and misstatements that its chief value has been to other editors of Franklin. Vol. vi. has on the title-page, 'Published from the originals by his Grandson William Temple Franklin.'" —Ford. P. L., Franklin Bibliography.

—See also 367.

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—See also 253.

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Wittenberg, 1806

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- 679a.—Sect. ii. *De inclinatione acus magneticae cuius innotescunt et locus et efficiendi facultas.* 50 pp. 4to. *Wittenberg, 1810*

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London, 1821
—See also 507.
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Philadelphia, (1807)
Paper of a personal, controversial nature.
—See also 769, 895, 906, 2754.
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London, 1807
Vol. i. theory of Aepinus, p. 382; von Kleist, p. 394; function of lightning-rods, p. 421; tourmaline, p. 427; vol. ii. contains a discussion of terrestrial magnetism. Abbé Hauey was among the foremost *savants* of his day.
—See also 541.
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Oxford, 1807
Allusions to the magnet: iron filings in brass basin with movable lodestone underneath; magnetic attraction and repulsion; Samothracian rings, p. 387. This is the didactic work of the Latin poet, to which allusion is frequently made by writers on magnetism. First printed edition, 1500.
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- 686a.—New edition with references and notes by P. Kelland. 2 vols. 8vo.
London, 1845
—See also 643.

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Experiments made with a heavy body suspended by a thread; the author holds that the swing of the pendulum is affected by neighboring substances according to their nature. A "dry" pile is referred to in a note on p. 270.
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690. **Spratt**, James. (1771-1853.) *Homograph; or Every man a signal tower.* 32 pp. 4 plates. Sm. 4to. *London, (1808)*
A method is proposed for signaling by means of a white handkerchief; numerous illustrations.
691. **Trommsdorff**, Johann B(artholomaeus). (1770-1837.) *Geschichte des Galvanismus; oder, der Galvanischen Electricitaet, vorzueglich in chemischer Hinsicht.* Second edition. 264 pp. 1 plate. 8vo. *Erfurt, 1808*
History of the early period of the electric current. The first edition of this work appeared in 1803.
692. **Venanson**, Flaminius. (— — — .) *De l'invention de la boussole nautique.* 172 pp. 8vo. *Naples, 1808*
The invention of the mariner's compass is attributed, after much discussion, to *Flavio Gioja* of Amalfi.
693. **Cancellieri**, Francesco Girolamo. (1751-1826.) *Dissertatione epistolare bibliografica sopra Christoforo Colombo di Caccaro nel Monferrate, scopritore dell' America, e Giovanni Gerson di Cavaglia abate di S. Stefano in Vercelli, autore del libro De imitatione Christi, al ch. sign. cavaliere Gioanfrancesco Galiani Napione di Cocconato Passano.* 2 parts. xi+415 pp. port. 8vo. *Rome, 1809*
The discovery of magnetic declination by Columbus is discussed, p. 58. Part i. contains: *Notizie storiche e bibliografiche di Christoforo Colombo.* Part ii.: *Notizie storiche e bibliografiche di Giovanni Gerson.*
694. **Capper**, James. (1743-1825.) *Meteorological and miscellaneous tracts, applicable to navigation, gardening and farming, with*

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calendars of Flora for Greece, France, England and Sweden. xix+211 pp. tab. 8vo. *Cardiff, (1809?)*

Observations on the aurora borealis and the barometer with scattered remarks on atmospheric electricity.

695. **Delaunay, Claude Veau** (also Veau de Launay, Claude Jean). (1755-1826.) Manuel de l'électricité, comprenant les principes élémentaires, l'exposition des systèmes, la description et l'usage des différens appareils électriques, un exposé des méthodes employées dans l'électricité médicale; avec treize planches; suivi d'une table chronologique de tous les ouvrages relatifs à l'électricité. iv+80+22 pp. 13 plates. 8vo. *Paris, 1809*

Careful exposition of static electricity preceded by historical sketch and followed by a *bibliography* of the subject.

696. **Franklin, Benjamin.** (1706-1790.) Works, consisting of his life, written by himself, together with essays, humorous, moral and literary. 2 vols. portr. 12mo. *Edinburgh, 1809*

The autobiography is followed by Dr. Stuber's continuation of Franklin's life. The story of the *Lightning Kite* is given on p. 135.

—See also 367.

- 697.* **(Green and Hazard.)** An epitome of electricity and galvanism. By two Gentlemen of Philadelphia. iv pp.+2 l.+xlvi pp.+2 l.+159 pp.+4 l. pl. 8vo. *Philadelphia, 1809*

This is one of the earliest works on electricity published in America; it contains a carefully written account of contemporary discoveries, experiments and investigations.

698. **Hager, Joseph.** (1757-1819.) Memoria sulla bussola orientale. 31 pp. ill. Folio. *Pavia, 1809*

The author gives the Chinese credit for the invention of the mariner's compass and also for a knowledge of magnetic variation; the pamphlet contains numerous references.

699. **Nicholson, William.** (1755-1815.) British encyclopedia; or Dictionary of arts and sciences, illustrated by Messrs. Lowry and Scott. 5 vols. pls. 8vo. *London, 1809*

There are short articles on electric and magnetic subjects; also a lengthy account of the life and works of Franklin.

—See also 510.

700. **Wesley, John.** (1703-1791.) Survey of the wisdom of God in the creation; or, A compendium of natural philosophy. 5 vols. 12mo. *London, 1809*

A handy encyclopaedia by the founder of Methodism; electricity and magnetism briefly treated. First edition, 1763.

—See also 403.

701. **Bywater, John.** (— — —) Essay on the history, practice and theory of electricity. iii+127 pp. 2 plates. 8vo. *London, 1810*

The author holds that there are two electric fluids, *viz.*, caloric and the constituent parts of the atmosphere, p. 94.

AN
EPITOME
OF
ELECTRICITY & GALVANISM.



BY TWO GENTLEMEN OF PHILADELPHIA.



Causa latet; vis est notissima.—Ovid's Met. B. .l. 287.

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Brief history of "galvanism" p. 57; Volta's pile, p. 60.
—See also 627.
703. **Delambre**, Jean Baptiste Joseph. (1749-1822.) Rapport historique sur les progrès des sciences mathématiques depuis 1789 et sur leur état actuel. vii+362 pp. 8vo. *Paris, 1810*
This historical report on the progress of mathematics was edited by Delambre, perpetual Secretary of the Academy of Sciences.
—See also 766.
704. **De Luc**, J(ean) A(ndré). (1727-1817.) On the electric column and aerial electroscope. (Nicholson's Philos. Journ. Ser. II., Vol. 27, pp. 81-114.) 8vo. *London, 1810*
Electrification due to contact; general effects.
—See also 661.
705. **Libes**, A(ntoine). (1752-1832.) Histoire philosophique des progrès de la physique. Vols I., II. (cplte in 4 vols.) 8vo. *Paris, 1810*
The progress of each branch of physical science briefly recorded; work of considerable merit.
—See also 637.
706. **Mackay**, Andrew. (1760-1809.) Theory and practice of finding the longitude at sea or land, to which are added various methods of determining the latitude of a place and variation of the compass, with new tables. Third edition. 2 vols. 8 plates. 8vo. *London, 1810*
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(First edition published in 1793.)
707. **Yatman**, Matthew. Familiar analysis of the fluid capable of producing the phenomena of electricity and galvanism, or combustion; with some remarks on simple galvanic circles, and their influence upon the vital principle of animals. 73 pp. 8vo. *London, 1810*
Electrical influence is the vital principle by which all nature is animated and regulated. Instances are given of its curative powers.
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Attempt at forming a universal language.
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The author's telegraph in which signals are made by the decomposition of water; diagram of apparatus.



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—See also 634.
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London, 1812
Electrical experiments with glass, ribbons, sealing-wax.
—See also 661.
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In the *Partidas* A. D. 1250, reference is made to the magnetic needle; original Spanish text with English translation p. 213. Southey, the poet laureate, was an accomplished Spanish scholar.
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Verona, 1812
Description of the author's "dry" pile, also that of De Luc.
—See also 775.
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The author's magnetic dynamometer and its use in establishing the law of the inverse square of the distance.
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- 716a.—(Another edition.) Vol. I. 8vo.
London, 1815
This edition was prepared by Dr. Augustus Chambers.
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(Paris,) 1813
Mathematical investigation of the distribution of charge in the case of two spheres in contact or apart.
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The author, a distinguished mathematician, is best known by his contributions to terrestrial magnetism and the compensation of ships' compasses.
—See also 765, 823, 1152, 2555.
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Chemical work in which the author puts in a prior claim for the atomic theory against Dalton; heat due to vibratory motion, p. 37.
- 722a.—Expériences et observations sur les théories atomistiques et les phénomènes électriques. (Extrait par M. H. Gaultier de Claubry.) (Journ. Phys. et Chim., Vol. 84, pp. 392-394.) 4to. *Paris, 1817*
—See also 885, 932, 2676.
723. **Mayer, Jo(hann) Tobias.** (1752-1830.) Commentatio de usu accuratori acus inclinatoriae magneticæ. (Comm. Soc. Sc. Goettingen, Math. Kl., Vol. 3. pp. 3-38) 1 plate. 4to. *Gottingen, 1814*
Construction and action of the dipping needle.
724. **Schweigger, J(ohann) S(alomo) C(hristoph).** (1779-1857.) Ueber die Umdrehung der magnetischen Erdpole und ein davon abgeleitetes Gesetz des Trabanten- und Planetenumlaufes in Briefen an W. Pfaff, nebst einem Schreiben des letztern ueber Kepler's Weltharmonie. 90 pp. 12mo. *Nuremberg, 1814*
Change in position of the earth's magnetic poles and its influence on the motion of planets.
—See also 1339, 1371.
725. **Singer, George John.** (1786-1817.) Elements of electricity and electro-chemistry. xxvii+480 pp. 1 plate. 8vo. *London, 1814*
The principles of static and voltaic electricity with numerous experimental illustrations. Two plates show the deflagration of wires of copper and gold by Leyden jar discharges. (See No. 2528.)

*Fao-simile copy of letter dated 5th Aug 1816 from Mr (afterwards Sir)
John Barrow Secretary of the Admiralty to Mr (afterwards Sir)
Francis Ronalds F.R.S relative to the Electric Telegraph.*

*Mr Barrow presents his Compl^{ts}
to Mr Ronalds, and acquaints him
with reference to his Letter of the 9th Inst,
that Telegraphs of any kind are now
wholly unnecessary; and that no
other than the one now in use
will be adopted*

*Yours truly
J. Barrow*

*Upper Mall,
Ed. Hammer Smith,*

729. BARROW.

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- 725a.—(French translation.) *Éléments d'électricité et de galvanisme*. Traduit de l'anglais et augmenté de notes par J. B. J. Thillaye. 655 pp. 5 plates. 8vo. *Paris, 1817*
—See also 2536.
726. (Volta, Alessandro.) (1745-1827.) *L'identita del fluido elettrico col cosi detto fluido galvanico vittoriosamente dimostrata, con nuove esperienze ed osservazioni*. Memoria comunicata al signore Pietro Configliachi. E aggiunto il catalogo delle sue opere stampate sino a tutto l'anno 1813. vi+145+vii pp. 8vo. *Pavia, 1814*
The matter of this volume—the identity of voltaic and galvanic electricity—was dictated by Volta to one of his pupils and edited by professor Configliachi.
—See also 428.
727. Wedgwood, R(alph.) *Book of Remembrance, the outline of an almanack constructed on the ancient cycles of times, and proving, by an harmony of prophetic numbers that this is the predicted era of new things, the final restitution of all things; the fulness of the Gentiles. Also that great Babylon is now fallen, and Satan binding, in the empire and person of Napoleon, etc.* (Appendix to vol. I. only published) 2 vols. ill. 24mo. *London, 1814*
Brief notice of a writing telegraph; see the *Electrician*, July 4, 1862.
728. Forster, Thomas. *Researches about atmospheric phenomena*. Second edition corrected and enlarged. With a series of engravings illustrative of the modifications of the clouds, etc. xvi+271 pp. 6 plates. 8vo. *London, 1815*
Work of interest on general meteorology; numerous quotations from classical writers; prevalent superstitions; atmospheric electricity.
- 728a.—Third edition, corrected and enlarged to which is added the calendar of nature. xiv+448 pp. 6 plates. 8vo. *London, 1823*
—See also 2523.
729. Barrow, (Sir) John. (1764-1848.) Facsimile copy of letter of August 1816 to Francis Ronalds relative to the electric Telegraph. 1 p. 4to. *1816*
The message of the letter is "Telegraphs of any kind are now wholly unnecessary."
—See also 670.
730. Donovan, M(ichael.) (1790—?) *Essay on the origin, progress and present state of galvanism; containing investigations, experimental and speculative of the principal doctrines offered for the explanation of its phenomena; and a statement of a new hypothesis*. xviii+390 pp. 1 plate. 8vo. *Dublin, 1816*
History and discussion of the early theories of voltaic electricity.
—See also 2526.

may, by possibility not have reached you, although it has been obscurely made known in London, namely that Volta proposed an electric telegraph in 1777. Amongst his Mss. an autograph addressed to Bartolotti (probably) contains accounts of sundry experiments with his gas pistols, and a proposal ("proposito") to transmit signals by means of ordinary electricity, this is dated Como 15 April 1777. & this much is stated by Prof. Magrini in a paper in the "Atti del R Istituto Lombardo di Scienze" Vol 2. I learn from Sig. Z. Volta that his father proposed to communicate with Milan (per Como) & to employ his Electro-phorus in charging the wire (or wires) but I cannot ascertain whether he proposed to charge the wire (or wires) by means of sparks given to it from the upper separated shield of that instrument, or whether the lower coating was to be retained in constant communication with the wire, & the signal made by means of the passage of a part of

the charge (of that coating) ^{to} into the wire, ~~and~~ ^{at the time of}
by separating the shield & insulating the
lower coating (about) simultaneously. I think
that the latter must have been his plan
for would it not be less wasteful? ~~There are~~
~~left~~ There are 2 large Electrophoni in his
collection but they are very much too small
for telegraphic purposes of any considerable
extent. Perhaps he would have used some
such contrivance as that of his friend Lieh-
tentung & Weber in a still larger &
improved scale.

May excuse this gossip (useless) and
believe that on my return to Home one of ^{my} the
first objects will be that of witnessing your
vast improvements in Telegraphy.

Yours Dear Sir
gratefully & faithfully
Thos. A. Ronalds

Latimer Clark Esq^r

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731. **Volta**, (Alessandro.) (1745-1827.) *Collezione dell opere del cavaliere conte Alessandro Volta.* 3 vols. in 5. pl. portr. 8vo.
Florence, 1816
Part I. Vol. 1. The electrophorus, p. 103; electrical condensation, p. 219; Vol. 2, animal electricity; Part II. Vol. 1, clouds electrified by friction sometimes positively and sometimes negatively, p. 270; the aurora borealis, p. 428; Part II, Vol. 2, letter to Sir Joseph Banks announcing discovery of battery, p. 95. (See No. 2497.) For early work on electric telegraph, see Ronald's letter, No. 3253a (reproduced on preceding pages).
—See also 428.
732. **Weber**, Joseph. (1753-1831.) *Vom dynamischen Leben der Natur ueberhaupt, und vom elektrischen Leben im Doppelelektrophor insbesondere,* 151 pp. 12mo. *Landshut, 1816*
Experiments with the electrophorus.
—See also 477.
733. **Bain**, William. (1775-1853.) *Essay on the variation of the compass; with observations and remarks.* 140 pp. 1 map. 8vo. *Edinburgh, 1817*
Discussion of agonic lines, magnetic dip, variation and direction of ship's head; Flinder's rules.
734. **Biot**, J(ean) B(aptiste). (1774-1862.) *On the laws of terrestrial magnetism in various parts of the earth.* Translated with notes, by T. S. Evans, 24 pp. 1 plate. 8vo. *London, 1817*
Chapter from the author's *Traité de Physique*, 1816.
—See also 633.
735. **Bompass**, Charles Carpenter. *Essay on the nature of heat, light and electricity.* x+266 pp. 8vo. *London, 1817*
The nature of electric attraction is discussed, electricity being considered a material entity; turmaline, p. 236; cause of magnetism, a peculiar ethereal fluid, p. 247.
736. **Bondioli**, Pietro Antonio. (1765-1808.) *Sopra l'aurora boreale.* (Nuovi Saggi sc. e lett. Acad. Sc. Padova, Vol. 1, pp. 55-79.) 12mo. *Padua, (1817)*
This pamphlet contains a long letter from Volta on the cause of polar aurorae.
737. **Clark**, Hewton, and **John Dougall**. (1787-1832?) *Cabinet of arts; or General instructor in arts, science, trade, practical machinery.* 859 pp. 7 plates. 8vo. *London, 1817*
A short section on electricity and another on magnetism.
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Pamphlet containing points of historic interest on standards.
—See also 811, 1142.
739. **Macdonald**, John. (1759-1831.) *Naval, military and political telegraphic dictionary numerically arranged.* 8vo. *London, 1817*
Comprehensive telegraphic dictionary in which numbers stand for words; it cost the author 15 years of continued work.
—See also 689.

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740. **Oppian.** (Second century.) Les Halientiques traduits du Grec du poème d'Oppien, ou traité de la pêche et des moeurs des habitans des eaux, par J. M. Limes. 396 pp. 1 plate. 8vo.
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Poetic description of the electric powers of the torpedo fish, p. 88, by the celebrated Greek poet.
741. **Ozeray, Michel-Jean-François.** (1764-1859.) Recherches sur Buddou ou Bouddou (Foe), instituteur religieux de l'Asie orientale; précédées de considérations générales sur les premiers hommages rendus au Créateur; sur la corruption de la religion, l'établissement des cultes du soleil, de la lune, des planètes, du ciel, de la terre, des montagnes, des eaux, des forêts, des hommes et des animaux. xxxv+137 pp. 8vo.
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Religion and practices of the Buddhists.
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Work on precious stones with a few pages on the magnet and its properties: Arabic text with Italian translation.
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The greater part of the work is a critical history of the subject; the rest treats of the theories advanced by Galvani and Volta.
744. **Clarke, George.** Treatise on the magnetism of the needle; on the Great Luminary, or reservoir of light called the Sun; the properties of light, etc. 24 pp. 12mo. *London, 1818*
"The sun's path at the equator being east and west, it is evident that its attraction for oxygen must be north and south and constitutes the magnetism of the needle", p. 12. (First edition published, 1816).
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Paris, 1818
Electrification of certain minerals by rubbing and by heating.
746. **Joyce, J(eremiah.)** (1763-1816.) Scientific dialogues, in which the first principles of natural and experimental philosophy are fully explained. Vol. 6: Electricity and Galvanism. 16mo. *London, 1818*
The elements of natural philosophy. (A complete set comprises 7 vols.)
- 746a.—(New edition.) Scientific dialogues. Intended for the instruction and entertainment of young people: in which the first principles of natural and experimental philosophy are fully explained. By the Rev. Jeremiah Joyce, with corrections by Dr. Olinthus Gregory. A new and enlarged edition containing the recent additions to science. By Charles V(incent) Walker. xvi+495 pp. ill. diagr. *London, 1853*

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747. **La Beaume** (Michael.) Observations on the properties of the air-pump, vapour-bath, pointing out their efficacy in the cure of gout, rheumatism, palsy, etc., with remarks on factitious airs and on the improved state of medical electricity. 88 pp. 8vo. (London, 1818?)
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Practical handbook of flag-signaling.
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Discussion of erroneous views popularly entertained concerning the divining-rod, lightning conductors, thunderbolts and the ringing of bells during thunderstorms.
752. **Vene**, A. Essai sur une nouvelle théorie de l'électricité contenant une réfutation du système des deux fluides vitré et résineux et une explication de plusieurs phénomènes météorologiques. 118 pp. 1 plate. 8vo. Arras, (1818?)
The author admits only one electrical fluid held in a body by molecular attraction.
753. **Vogel**, (Johann) Ludwig (Andreas.) (1771-1840.) Die Wunder des Magnetismus. 280 pp. 8vo. Erfurt, (1818)
Chapter on animal electricity.

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- 754.† **Aldini, Giovanni.** (1762-1834.) General views on the application of galvanism to medical purposes principally in cases of superseded animation. viii+96 pp. 8vo. *London, 1819*
Apparatus and application in certain cases of difficult breathing or suspended animation. Sulzer's experiment on "Galvanic taste" anticipating Galvani and Volta.
—See also 575.
755. **Berzelius, Joens Jacob.** (1779-1848.) Essai sur la théorie des proportions chimiques et sur l'influence chimique de l'électricité, traduit du Suédois sous les yeux de l'auteur et publié par lui-même. xvi+190+120 pp.+1 l. 8vo. *Paris, 1819*
Electricity, the cause of chemical affinity; light and heat are some of its modifications, p. 91.
—See also 721.
756. **Hansteen, Christopher.** (1784-1873.) Untersuchungen ueber den Magnetismus der Erde, uebersetzt von P. Treschow Hanson. Part 1. With Atlas. xxx+502+148 pp. 7 maps, 5 plates. 4to. Folio. *Christiania, 1819*
The fifth chapter deals with the mathematical theory of magnetism; the author favors Halley's views regarding terrestrial magnetism, which assign to the earth two magnetic axes. (See Nos. 2649, 2698.)
—See also 860, 1018, 1321, 1458, 2575bis.
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The appendix contains lengthy account of signaling by means of mechanical telegraphs.
—See also 689.
758. **Mitchell, James.** (1786-1844.) Elements of natural philosophy, illustrated by experiments which may be performed without regular apparatus. xx+362 pp. 1 plate. 12mo. *London, 1819*
Elementary textbook; magnetic declination, p. 279.
—See also 834.
759. **Muncke, G(eorg) W(ilhelm.)** (1772-1847.) Anfangsgruende der Naturlehre. 2 vols. 2 plates. 8vo. *Heidelberg, 1819-1820*
Textbook with chapters on electricity and magnetism.
—See also 850.
760. **Redern, (Sigismond Ehrenreich von.)** On the sentient faculty, and principles of human magnetism; translated from the French and elucidated with notes by Francis Corbaux. 217 pp. 8vo. *London, 1819*
Brief history of mesmerism.

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761. **Marum, Martin van.** (1750-1837.) Sur la théorie de Franklin, suivant lequel les phénomènes électriques sont expliqués par un seul fluide. 29 pp. 1 plate. 8vo. (Harlem,) 1819
The one-fluid theory of electricity and its modification by Aepinus.
- 761a.—Observations on a memoir. "On the theory of Franklin according to which electrical phenomena are explained by a single fluid." Read at the Royal Institution of Sciences at Amsterdam by M. Martin van Marum. (Ann. of Philos. N. S. Vol. I, pp. 181-186.) 1 plate. 8vo. London, 1821
"Franklin impeded the progress of science by his hypothesis respecting electricity which seems inevitably doomed to death," p. 182.
—See also 461.
762. **Ampère, André Marie.** (1775-1836.) Mémoires sur l'action mutuelle de deux courants électriques, sur celle qui existe entre un courant électrique et un aimant ou le globe terrestre, et celle de deux aimans, l'un sur l'autre. (Ann. Chim. Phys., Vol. 15, pp. 59-76+170-218) 5 plates.—Conclusions de Mémoires. 2 pp. 8vo. 4to. Paris, 1820
Three classical papers on the fundamental principles of electro-dynamics.
(See No. 838bis.)
- 763.—Notes sur les lectures qu'il a faites à l'Académie des Sciences. (On the mutual action of two electrical elements and on electro-magnetism.) (Journ. Phys. Vol. 91, pp. 226-230; Vol. 92, pp. 304-309) 4to. Paris, 1820-1821
Abstract of the author's communications to the French Academy in 1820-1821.
- 763a.—Note sur un mémoire lu à l'Académie Royale des Sciences dans la séance du 4 Dec. 1820 (Extract, Journ. Phys., 1820) 4 pp. 4to. Paris, 1820
—See also 777, 784, 796, 838bis, 1853, 1930bis, 2561.
764. **Barclay, John.** Elements of natural and experimental philosophy. xvii+450 pp. ill. 5 plates. 12mo. London, 1820
General phenomena of electricity and magnetism.
765. **Barlow, Peter.** (1776-1862.) Essay on magnetic attractions; particularly as respects the deviation of the compass on ship-board occasioned by the local influence of the guns, etc., with an easy practical method of observing the same in all parts of the world. xii+145 pp. 1 plate. 8vo. London, 1820
Experiments made to ascertain the local attraction of ship's guns on the compass. Remarks on the reversal of polarity in steel bars, p. 124; Morichini's observation of the supposed magnetic effect due to violet rays, p. 130; beams of magnetic matter in the atmosphere, p. 131.
- 765a.—Essay on magnetic attractions and on the laws of terrestrial and electro-magnetism comprising a popular course of curious and interesting experiments on the latter subject, and an easy experimental method of correcting the local attraction of vessels on the compass in all parts of the world.

PREMIER MEMOIRE.

*De l'Action exercée sur un courant électrique ,
par un autre courant, le globe terrestre ou un
aimant.*

§ 1^{er}. *De l'Action mutuelle de deux courans électriques.*

L'ACTION électro-motrice se manifeste par deux sortes d'effets que je crois devoir d'abord distinguer par une définition précise.

J'appellerai le premier *tension électrique*, le second *courant électrique*.

Le premier s'observe lorsque les deux corps entre lesquels l'action électro-motrice a lieu sont séparés l'un de l'autre (1) par des corps non conducteurs dans tous les points de leur surface autres que ceux où elle est établie ; le second est celui où ils sont, au contraire, partie d'un circuit de corps conducteurs qui les font communiquer par des points de leur surface différens de ceux où se produit l'action électro-motrice (2). Dans le premier

(1) Quand cette séparation a lieu par la simple interruption des corps conducteurs, c'est encore par un corps non conducteur, par l'air, qu'ils sont séparés.

(2) Ce cas comprend celui où les deux corps ou systèmes de corps entre lesquels a lieu l'action électro-motrice, seraient en communication complète avec le réservoir commun qui ferait alors partie du circuit.

CATALOGUE OF WHEELER GIFT

Second edition, much enlarged and improved. Illustrated with plates by Lowry. xii+303 pp. 6 plates. 8vo.

London, 1823

Important additions made to the first edition; rate of chronometer as affected by magnetism of ships; the author's two-fluid theory; magnetic action of iron spheres, bars and masts; experiments in electro-magnetism. (See Nos. 2571, 2655a.)

—See also 720.

766. **Delambre**, (Jean Baptiste Joseph.) (1749-1822.) Mémoires contenant des expériences relatives à l'action mutuelle de deux courants électriques, et à celle qui existe entre un courant électrique et le globe de la terre ou un aimant; par M. Ampère. (Extract, l'Analyse des travaux de l'Académie des Sciences, Partie Mathématique) 15 pp. 4to. *Paris, 1820*
The mutual action of conductors conveying currents; Ampère's laws; Arago's discoveries in electromagnetism, 1820.
—See also 703.

767. **Gregory**, G(eorge.) (1754-1808.) Lectures on experimental philosophy, astronomy and chemistry. Second edition. 2 vols. 35 plates. 12mo. *London, 1820*
Two short lectures on electricity.
—See also 598.

768. **Hachette**, (Jean Nicholas Pierre.) (1769-1834.) Sur les expériences électro-magnétiques de MM. Oersted et Ampère. (Journ. Phys., Vol. 91, pp. 161-169) 4to. *Paris, 1820*
Use of mariner's compass in France in 1260, p. 1; Oersted's experiment, p. 2; polarity of ship's compass reversed by lightning, p. 4; Ampère's experiments with solenoids, p. 5; magnetic action of current through battery itself, p. 5; action of earth on conductor carrying current, p. 7.

769. **Hare**, R(obert.) (1781-1858.) Memoir on some new modifications of galvanic apparatus, with observations in support of his new theory of galvanism. 17 pp. 1 plate. 8vo. *(Philadelphia), (1820?)*

Description of "deflagration." Dr. Hare was a distinguished American chemist and physicist.

—See also 683.

770. **La Beaume**, (Michael.) Remarks on the history and philosophy, but particularly on the medical efficacy of electricity in the cure of nervous and chronic disorders and in various local affections, as blindness, deafness, etc., together with observations on galvanism as an efficient substitute for mercurial remedies in bilious and stomach complaints. Second edition, greatly enlarged. xix, 21-273 pp. 2 plates. 12mo. *London, 1820*

Brief history of electricity; its properties and curative powers in cases of nervous and chronic disorders.

—See also 747.

771. **Lapostolle**, (Alexandre Ferdinand Leonce.) Traité des parafoudres et des paragrêles en cordes de paille précédé

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d'une météorologie électrique présentée sous un nouveau jour et terminée par l'analyse de la bouteille de Leyde. v+320 pp.—Premier Supplement: Appel à l'opinion publique, ou Réponse à un rapport fait à l'Académie Royale des Sciences de Paris, dans sa séance du 24 juillet, 1820. 24 pp. 8vo.

Amiens, 1820

After considering the effects of lightning and describing his straw-rope lightning-rod, the author proposes similar means to prevent the destruction of crops by hailstorms.

772. **Lecount**, P(eter.) A description of the changeable magnetic properties possessed by all iron bodies, and the different effects produced by the same on ships' compasses, from the position of the ship's head being altered. 55 pp. ill. 8vo.

London, 1820

General theory and practise of compass compensation.

773. **Oersted**, H(ans) C(hristian.) (1770-1851.) Experimenta circa effectum conflictus electrici in acum magneticam. 4 pp. Sm. 4to.

Copenhagen, 1820

The celebrated and excessively rare four-page announcement of the discovery of the magnetic effect of the electric current. A translation into English, dated July 21, 1820, was made by Oersted for Thomson's *Annals of Philosophy* (pp. 273-275, vol. xvi., 1820), to which is appended a note by the author as follows: "I have demonstrated in a book published five years ago that heat and light consist of the conflict of the electricities. From the observations now stated, we may conclude that a circular motion likewise occurs in these effects." The Latin text and an English translation by Rev. J. E. Kempe, accompanied by a fac-simile signature and brief biography of Oersted, are printed in the *Journal of the Society of Telegraph Engineers*, vol. v., 1876, pp. 459-469.

- 773a.—(French translation.) Expériences sur un effet que le courant de la pile excite dans l'aiguille aimantée. (Journ. Phys. Chim. et d'Hist. Nat., Vol. 91, pp. 72-80.) 1 plate. 4to.

Paris, 1820

The magnetic effect of the electric current discovered by the author; also note by Ampère containing the electrodynamical laws.

—See also 1184, 2580.

774. **Seebeck**, (Johann Thomas.) (1770-1831.) Ueber den Magnetismus der galvanischen Kette. (Abh. Akad. Wiss. Berlin, 1820-1821, pp. 289-346) 3 plates. 4to.

Berlin, 1820-1821

Action of the electric current on a magnetic needle; research on the Oersted effect. Seebeck's earliest magnetic work of importance.

—See also 806.

775. **Zamboni**, Giuseppe. (1776-1846.) L'elettromotore perpetuo. Trattato. Parte prima e seconda. 298+361 pp. Ill. 8vo.

Verona, 1820-1822

General electrical phenomena; details of the author's "dry" pile.

—See also 714.

776. **Althaus**, Julius von. (1791—?) Versuche ueber den Elektromagnetismus nebst einer kurzen Pruefung der Theorie des

EXPERIMENTA

CIRCA EFFECTUM

CONFLICTUS ELECTRICI IN ACUM MAGNETICAM.

Prima experimenta circa rem, quam illustrare aggredior, in scholis de Electricitate, Galvanismo et Magnetismo proxime-superiori hieme a me habitis instituta sunt. His experimentis monstrari videbatur, acum magneticam ope apparatus galvanici e situ moveri; idque circulo galvanico cluso, non aperto, ut frustra tentaverunt aliquot abhiuc annis physici quidam celeberrimi. Cum autem hæc experimenta apparatu minus efficaci instituta essent, ideoque phænomena edita pro rei gravitate non satis luculenta viderentur, socium adscivi amicum Esmarch, regi a consiliis justitiæ, ut experimenta cum magno apparatu galvanico, a nobis conjunctim instructo, repeterentur et augerentur. Etiam vir egregius Wleugel, eques auratus ord. Dan. et apud nos præfectus rei gubernatoriæ, experimentis interfuit, nobis socius et testis. Præterea testes fuerunt horum experimentorum vir excellentissimus et a rege summis honoribus decoratus *Hauch*, ejus in rebus naturalibus scientia jam diu inclaruit, vir acutissimus *Reinhardt*, Historiæ naturalis Professor, vir in experimentis instituendis sagacissimus *Jacobsen*, Medicinæ Professor, et Chemicus experientissimus *Zeise*, Philosophiæ Doctor. Sæpius equidem solus experimenta circa materiam propositam institui, quæ autem ita mihi contigit detegere phænomena, in conventu horum virorum doctissimorum repetivi.

In experimentis recensendis omnia præteribo, quæ ad rationem rei invenientiam quidem conduxerunt, hac autem inventa rem amplius illustrare nequeunt; in eis igitur, quæ rei rationem perspicue demonstrant, acquiescamus.

Apparatus galvanicus, quo usus summus, constat viginti receptaculis cupreis rectangularibus, quorum et longitudo et altitudo duodecim æqualiter est pollicum, latitudo autem duos pollices et dimidium vix excedit. Quodvis receptaculum duabus laminis cupreis instructum est ita inclinatis, ut baculum cupreum, qui laminam zincæ in aqua receptaculi proximi sustentat, portare possint. Aqua receptaculorum $\frac{1}{2}$ sui ponderis acidi sulphurici et pariter $\frac{1}{2}$ acidi nitrici continet. Pars cujusque laminæ Zincæ in aqua submersa Quadratum est, cujus latus circiter longitudinem 10 pollicum habet. Etiam apparatus minores adhiberi possunt, si modo filum metallicum candefacere valeant.

773. OERSTED. (Reduced.)

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- Herrn Ampère; mit einer Vorrede vom Hofrath Muncke. 57 pp. 1 plate. 12mo. *Heidelberg, 1821*
 Remarks on Ampère's electro-dynamical experiments.
777. **Ampère**, (André Marie.) (1775-1836.) Réponse à la lettre de M. van Beek, sur une nouvelle expérience électro-magnétique. (Journ. Phys. Chim. et d'Hist. Nat., Vol. 93, pp. 447-467) 4to. *Paris, 1821*
 Reply to van Beek's criticism. (See No. 783.)
 —See also 762.
778. **Cumming**, J(ames.) (1777-1861.) On the application of magnetism as a measure of electricity. (Trans. Cambridge Philos. Soc., Vol. 1, pp. 15-20) 1 plate. 4to. *Cambridge, 1821*
 Early form of the tangent galvanometer; first recorded use of a wire surrounding a pivoted needle to measure strength of current.
 —See also 786, 827, 2572.
779. **Enfield**, W(illiam.) Scientific amusements in philosophy and mathematics; including arithmetic, acoustics, electricity, magnetism, optics, pneumatics, together with amusing secrets in various branches of science. xii+276 pp. 1 plate. 12mo. *London, 1821*
780. **Erman**, P(aul.) (1764-1851.) Umriss zu den physischen Verhältnissen des von Herrn Oersted entdeckten elektrochemischen Magnetismus. 112 pp. 1 plate. 2 tables. 8vo. *Berlin, 1821*
 Observations and experiments on the effect of a current on the dipping and compass needles; Zamboni's "pile".
781. **Oersted**, J. B. Considérations sur l'électro-magnétisme. (Journ. Phys. Chim. et d'Hist. Nat., Vol. 93, pp. 161-180) 1 plate. 4to. *Paris, 1821*
 Researches on electro-magnetism.
782. **Schrader**, C. De electro-magnetismo. Quam consensu illustris medicorum ordinis in inclyta Academia Fridericiana Halensi defendit. 35 pp. 1 plate. 8vo. (Dissertatio inauguralis medico-physica.) *Halle, 1821*
 Schweigger's multiplier; some medical uses of the voltaic current.
783. **Beek**, A(lbert) van. (1787-1856.) Lettre à M. Ampère. (Journ. Phys. Chim. et d'Hist. Nat., Vol. 93, pp. 312-320) 4to. *Paris, 1821*
 Remarks on Ampère's theory of magnetism. (See No. 777.)
784. **Ampère**, (André Marie.) (1775-1836.) Recueil d'observations électro-dynamiques, contenant divers mémoires, notices, extraits de lettres, relatifs à l'action mutuelle de deux courants électriques, à celle qui existe entre un courant électrique et un aimant ou le globe terrestre et à celle de deux aimans l'un sur l'autre. 344 pp. 9 plates. 8vo. *Paris, 1822*
 The author's classical investigations in electro-dynamics together with experimental illustrations. Also a paper by *De la Rive* on the action of the earth on a movable circuit carrying a current.

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- 785.— —Notice sur les nouvelles expériences électro-magnétiques faites par différens physiciens, depuis le mois de mars 1821. (Journ. Phys. Chim. et d'Hist. Nat., Vol. 94, pp. 61-66) 4to. *Paris, 1822*
Brief exposition of the author's theory of magnetism.
See also 762.
786. **Cumming**, J(ames). (1777-1861.) On the connexion of galvanism and magnetism. (Trans. Cambridge Philos. Soc., Vol. I, pp. 269-280) 4to. *Cambridge, 1822*
Discussion of several effects of the current especially its action on a magnetic needle.
—See also 778.
787. **Faraday**, Michael. (1791-1867.) Description of an electro-magnetical apparatus for the exhibition of rotatory motion. (Quart. Journ. Sc., Vol. 12, pp. 283-285) 1 plate. 8vo. *London, 1822*
Rotation of a current round the pole of a magnet. (Autograph copy).
- 787a.— —Note on new electro-magnetical motions. (Quart. Journ. Sc., Vol. 12, pp. 416-421) 8vo. *London, 1822*
—See also 959, 1282, 1353, 1488, 2549.
788. **Luscombe**, E(dmund) and M(atthias) **Luscombe**. Langue télégraphique universelle, ou, Code de signaux adoptés dans les marines marchandes de France et d'Angleterre et transmis par ordre du gouvernement britannique aux commandants de tous les bâtimens du Roi, pour leur servir de communication avec les navires marchands, adapté à l'usage du commerce maritime de France. 3 plates. 8vo. *Havre, (1822?)*
Flags for signaling in the navy; the authors are said to have been the first to use colored flags for the purpose.
789. **Moll**, G(erit.) (1785-1838.) Sur des expériences électro-magnétiques. (Journ. Phys. Chim. et d'Hist. Nat., Vol. 94, pp. 379-388) 4to. *London, 1822*
Magnetization of needles by the current.
790. **Roberts**, G(eorge.) Catechism of electricity. Second edition. (Pinnock's Catechisms) 71 pp. ill. 16mo. *Berlin, (1822)*
—See also 826.
791. **Robison**, John. (1739-1805.) System of mechanical philosophy, with notes by David Brewster. 4 vols. 8vo. *Edinburgh, 1822*
Lengthy treatment of static electricity; discussion of magnetic declination, its cyclic and irregular changes. Earthquakes and the compass, p. 371.
792. **Heyden**, J. M. van der. Lettre à M. Ampère. (Journ. Phys. Chim. et d'Hist. Nat., Vol. 94, pp. 67-71) 4to. *Paris, 1822*
Reference to the author's memoir on electro-magnetism.
- 793.— —Mémoire sur l'électro-magnétisme. (Journ. Phys. Chim. et d'Hist. Nat., Vol. 94, pp. 284-296+321-344) 1 plate. 4to. *Paris, 1822*
Series of electro-magnetical experiments.

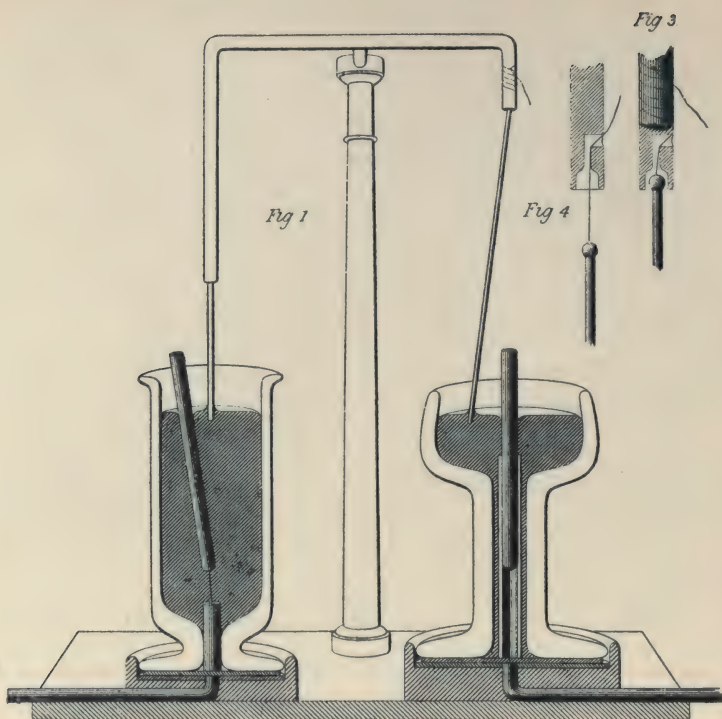


Fig 3

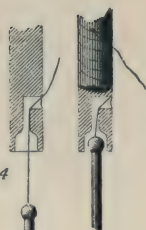


Fig 4



Fig. 5

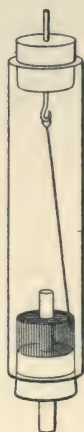
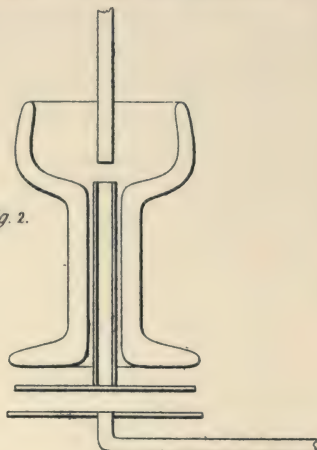


Fig. 2.



L.A. 461

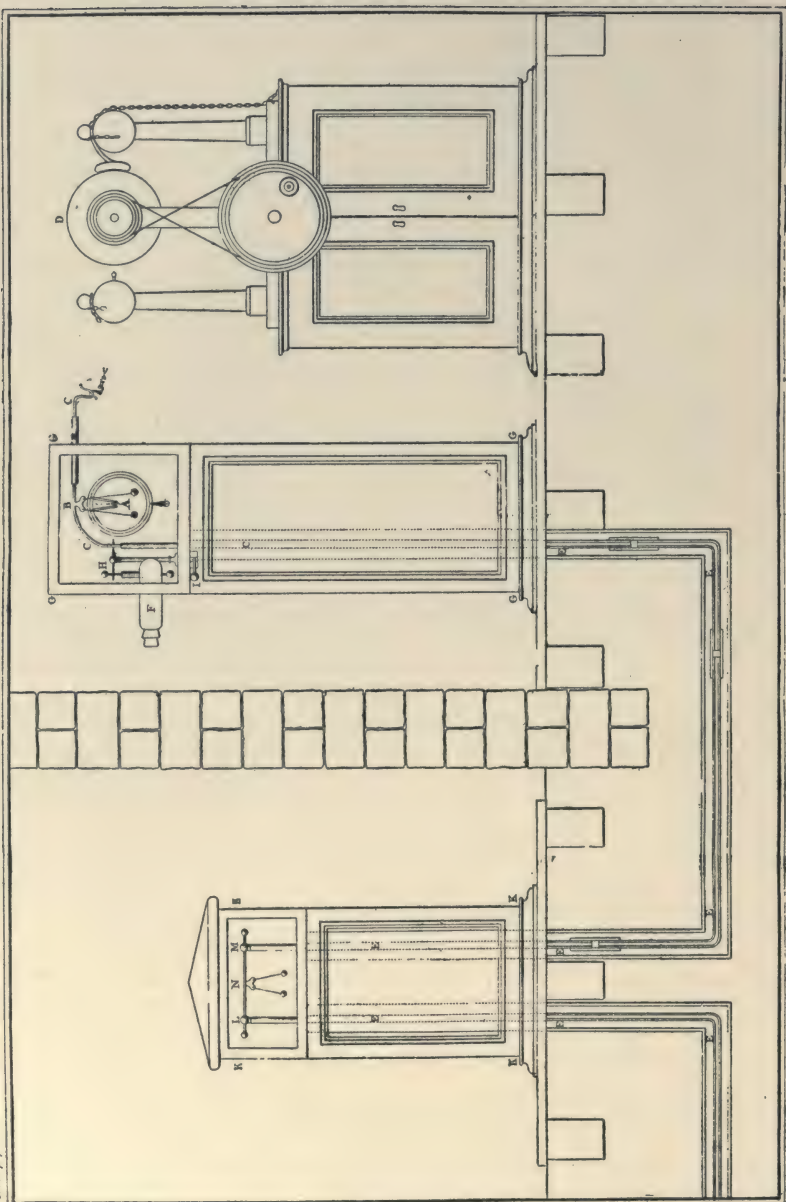
J.B. Taylor & Co.

London Published by J. Murray Albemarle Street, January 1, 1822.

787. FARADAY. (Reduced.)

CATALOGUE OF WHEELER GIFT

794. **Wit, Aegidius de.** Responsio ad quaestionem propositam: Describantur, et quantum id experientia duce fieri potest, explicantur acus magneticae phaenomena. Ostendatur illius usus in nautica arte, atque viae maxime expeditae, quibus eius declinatio, inclinatio, atque vis magneticae, qua praedita est, intensitas, definiri possint. (Ann. Acad. Rheno-Trajectinae, 1821-1822) 78 pp. 1 plate. 8vo. *Utrecht, 1822*
This dissertation offers a physical explanation of magnetic attraction, repulsion, declination and dip.
795. **Primum mobile;** or, Solar repulsion; being a query concerning the primary cause of motion in the solar system, as connected with gravity. By the Author of "Creation," a poem. 11+264 pp. 1 plate. 8vo. (Privately printed.) *Liverpool, 1822*
Speculations on the cause of the changes in magnetic declination, the nature of negative electricity, the zodiacal light, and polar aurorae.
796. **Ampère, (André Marie.)** (1775-1836.) Exposé méthodique, des phénomènes électro-dynamiques et des lois de ces phénomènes (Journ. Phys. Chim. et d'Hist. Nat., Vol. 96, pp. 248-257) 4to. *Paris, 1823*
Consecutive account of electrodynamic phenomena beginning with the mutual repulsion of the elements of a rectilinear current.
—See also 762.
797. **Demonferrand, J(ean) B(aptiste) F(irmin.)** (1795-1844.) Manuel d'électricité dynamique, ou, traité sur l'action mutuelle des conducteurs électriques et des aimants. 210 pp. 10 plates. 8vo. *Paris, 1823*
Fundamental phenomena and laws of electro-dynamics. (See No. 827.)
798. **Donker, Curtius Boudewin.** Commentatio ad quaestionem physicam de convenientia atque differentia effectuum tensionis electricae et fluxus electrici. 53 pp. 4to. *Leyden, 1823*
Electro-magnetic phenomena; Ampère's theory.
799. **Eyk, S. Speyert van der.** Verhandelning over het electro-magnetismus. 30 pp. 1 plate. 8vo. *Harlem, 1823*
Polarity and magnetic action of solenoids.
800. **Ferguson, James.** (1710-1776.) Essays and treatises, with an appendix relative to electricity, galvanism and electro-magnetism by David Brewster. v+382 pp. 14 plates. 8vo. *Edinburgh, 1823*
Forty pages on elementary electricity.
—See also 429.
801. **Harris, (Sir) William Snow.** (1792-1867.) Observations on the effects of lightning on floating bodies, with an account of a new method of applying fixed and continuous conductors of electricity to the masts of ships; in a letter addressed to Sir Thomas Byam Martin. 89 pp. 5 plates. 4to. *London, 1823*
—See also 838, 841, 1019, 1043, 1114, 1143, 1180, 1230, 1358, 1676, 2556.



803. RONALDS. (Reduced.)

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802. **Kaemtz**, Ludwig Friedrich. (1801-1867.) *De legibus repulsionum electricarum mathematicis.* (Inaugural dissertation.) 29 pp. 1 plate. 8vo. *Halle, 1823*
Criticism of the evidence given by Coulomb and others for the law of the inverse square of the distance.
—See also 1076.
803. **Ronalds**, (Sir) Francis. (1788-1873.) *Descriptions of an electrical telegraph and of some other electrical apparatus.* 83 pp. 8 plates. 8vo. *London, 1823*
Buried conductors, p. 17; experiments on atmospheric electricity, p. 28; "dry" pile, p. 66. Account of experiments on signaling by static electricity undertaken in 1816. The apparatus of Ronalds was the prototype of electrical dial-telegraphs; pamphlet of historic interest. (See No. 729.)
- 803a.—Description of an electrical telegraph. Second edition. 25 pp. 4 plates. 8vo. *London, 1871*
—See also 846, 1149, 1338, 2207, 2534.
804. **Savary** (Savart Felix). (1797-1841.) *Mémoire sur l'application du calcul aux phénomènes électro-dynamiques.* 26 pp. 1 plate. 4to. *Paris, 1823*
Discussion of Ampère's mathematical formulæ.
—See also 2612.
805. **Scoresby**, William. (1789-1857.) *Description of a magnetometer, being a new instrument for measuring magnetic attractions, and finding the dip of the needle; with an account of experiments made with it.* (Trans. Roy. Soc. Edinburgh, Vol. 9, pp. 243-258) 1 plate. 4to. *Edinburgh, 1823*
The paper contains a number of remarks and experiments on magnets in general; illustration of the author's dipping needle.
—See also 1070, 1466, 2545.
806. **Seebeck**, (Johann Thomas.) (1770-1831.) *Magnetische Polarisation der Metalle und Erze durch Temperatur-Differenz.* (Abh. Akad. Wiss. Berlin, 1822-1823, pp. 265-373) 2 plates. 4to. *Berlin, 1823*
Researches in thermo-electricity; the author was one of the earliest investigators.
—See also 774.
807. **Smith**, James. *Panorama of science and art.* 2 vols. 1 plate. 8vo. *Liverpool, 1823*
The leading facts and principles of magnetism and electricity.
808. **Yelin**, Julius (Konrad) von. (1771-1826.) *Neue elektro-magnetische Versuche; die magneto-motorische Wirkung der fluessigen Saeuren, Basen und Salze mittelst einfacher metallischer Leiter und einer einfachen Ladungssaule mit trennbaren einpoligen Elementen.* 15 pp. 4to. *Munich, 1823*
The magnetic effect of the electric current.
809. **Biot**, J(ean) B(aptiste). (1774-1862.) *Précis élémentaire de physique expérimentale.* Troisième édition. 2 vols. 18 plates. 8vo. *Paris, 1824*
Manual of general physics; standard text-book. (First edition published in 1807).
—See also 633.

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810. **Chappe**, (Ignaz Urbain Jean.) (1760-1828.) Histoire de la télégraphie. 268 pp. 24 plates. 8vo. *Paris, 1824*
Description of the various mechanical methods employed for transmitting signals.
811. **Gregory**, Olinthus Gilbert. (1774-1841.) Lessons, astronomical and philosophical, being an attempt to explain the most usual appearances in nature. Sixth edition. xii+334 pp. 2 plates. 12mo. *London, 1824*
Brief account of electricity, lightning and polar aurorae.
—See also 738.
812. **Pfaff**, C(hristian) H(einrich.) (1773-1852.) Der Elektro-Magnetismus, eine historisch kritische Darstellung der bisherigen Entdeckungen auf dem Gebiete desselben; nebst eigenthüemlichen Versuchen. xiv+288 pp. 8 plates. 8vo. *Hamburg, 1824*
Critical history of electro-magnetism to which the author adds some experiments of his own.
—See also 1083.
813. **Vernier**, Hippolyte. De la distribution de l'électricité à la surface des corps conducteurs. (Thèse de mécanique.) 16 pp. 4to. *Paris, 1824*
Mathematic treatment of the distribution of electricity on the surface of the conductors.
814. **Description** d'un appareil électro-dynamique, construit par M. Ampère. 24 pp. 1 plate. 8vo. *Paris, 1824*
Ampère's table; paper on electromagnetic reactions.
815. **Electricity and Magnetism**. (Preliminary dissertations, Diss. iv. pp. 617-630.) 4to. *(London, 1824?)*
The article contains biographical and critical foot-notes.
816. **Hulde aan de nagedachtenis van Jean Henri van Swinden**. x+122 pp. portr. 8vo. *Amsterdam, 1824*
The first part is a panegyric of the author and the second a eulogy in verse. These are followed by a list of van Swinden's works.
817. **Bremner**, James. Mystery of magnetism, fully discovered by experiments intuitively evident, which admit of no question. 105 pp. 8vo. *London, 1825*
Metaphysical rather than physical treatment of the subject.
818. **De la Rive**, Auguste (Arthur.) (1801-1873.) Recherches sur le mode de distribution de l'électricité dynamique dans les corps qui lui servent de conducteurs. (Mém. Soc. Phys. et d'Hist. Nat., Vol. 3. pp. 109-129) 4to. *Geneva, 1825*
Distribution of current in a linear conductor.
—See also 824, 902, 957, 976, 996, 1251, 1450, 1670, 1767, 1794, 1827, 2627.
819. **Ferguson**, James. (1710-1776.) Lectures on electricity, a new edition corrected, with an appendix by C(harles) F(red) P(artington). 102 pp. 1 plate. 8vo. *London, 1825*
Some experiments on static electricity with application to medical cases.
—See also 429.

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820. **Gehler**, Johann Samuel Traugott. (1751-1795.) *Physikalisches Woerterbuch*. Neu bearbeitet von (Heinrich Wilhelm) Brandes, (Leopold) Gmelin, (Johann Caspar) Horner, (Georg Wilhelm) Muncke, (Christian Heinrich) Pfaff, (Joseph Johann) von Littrow und (Ludwig) von Littrow. 11 vols. in 23 and atlas (278 plates, 6 maps) 8vo. *Leipzig, 1825-1845*
Dictionary of physical terms.
821. **Jackson**. Substance of twelve lectures on select subjects in natural philosophy, intended to illustrate the present state of science. xviii+444 pp. 1 plate. 12mo. *London, 1825*
General illumination by means of vacuum tubes, p. 104.
- 822.* **Richardot**, C(harles). (1771-1852.) *Nouveaux appareils contre les dangers de la foudre et le fléau de la grêle ou système général des paragrêles*. Second edition. 44 pp. 8vo. *Paris, 1825*
Hail being often accompanied by strong electrical manifestations, lightning-rods and vertical wires ending in points are recommended as means for preventing the formation of hail; description of simple forms of *paragrêles* for use on farms.
—See also 1105.
823. **Magnetism**. Essay on magnetic attraction. By P(eter) Barlow. —Magnetism (*Encyclopaedia Metropolitana*)—*Recherches sur le magnétisme*. By (Siméon Denis) Poisson. (*Westminster Review*, Vol. 3, pp. 333-358) 8vo. *London, 1825*
General magazine review of the above-named works; Gilbert's *De magnete* (see No. 72), Norman's *New Attractive* (see No. 66), work of Hansteen, Biot and Barlow.
—See also 718, 720.
824. **De la Rive**, A(uguste Arthur). (1801-1873.) *Recherches sur une propriété particulière des conducteurs métalliques de l'électricité*. (*Mém. Soc. Phys. et d'Hist. Nat.*, Vol. 3, pp. 201-216) 4to. *Geneva, 1826*
Polarization of electrodes.
—See also 818.
825. **Pohl**, Georg Friedrich. (1788-1849.) *Der Process der galvanischen Kette*. xxiv+430 pp. 8vo. *Leipzig, 1826*
Nature of the action of the voltaic pile; properties of the electric current.
—See also 1145, 2640.
826. **Roberts**, G(eorge.) *Catechism of chemistry*. Fifth edition. (*Pinnock's catechisms*) 72 pp. ill., portr. of Franklin. 16mo. *London, (1826?)*
—See also 790.
827. **Cumming**, James. (1777-1861.) *A manual of electrodynamics, chiefly translated from the Manuel d'électricité dynamique; or Treatise on the mutual action of electric conductor's and magnets of J(ean) F(irmin) (Baptiste) Demonferrand with notes*

Die
galvanische Kette,

mathematisch bearbeitet

von

Dr. G. S. Ohm.

Mit einem Figurenblatte.

Berlin, 1827.

Bei T. H. Riemann.

835. OHM.

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and additions comprehending the latest discoveries and improvements. viii+291 pp. 7 plates. 8vo. *Cambridge, 1827*

The main feature of the work is a description of Ampère's theory and experiments in electro-dynamics. (See No. 797.)

—See also 778.

828. Daniell, J(ohn) Frederic. (1790-1845.) Meteorological essays and observations. Second edition. viii+643 pp. 5 plates. 8vo. *London, 1827*

Aurora borealis; new hygrometer; determination of heights by means of barometers. The author invented the primary battery which bears his name.

—See also 955, 2704.

829. Davy, (Sir) Humphry. (1778-1829.) Six discourses delivered before the Royal Society at their anniversary meetings, on the award of the Royal and Copley medals; preceded by an address to the Society on the progress and prospects of science. 4to. *London, 1827*

Arago's discoveries in magnetism and Barlow's method of correcting compass errors are dwelt upon by Davy in his presidential discourse, 1825.

—See also 634.

830. Ermerins, Jacob Janus. De lege repulsionis electricae. (Inaugural dissertation) 54 pp. 2 tables. 1. 8vo. *Leyden, 1827*
Coulomb's law of electrical repulsion.

831. Green, Jacob. (1793-1841.) Electro-magnetism, being an arrangement of the principal facts hitherto discovered in that science. 216 pp. pl. 16mo. *Philadelphia, 1827*

Epitome of electro-magnetism; Magnetic telegraph deemed impossible by Barlow, p. 39; rubbing glass of compass deflects needle, p. 104; pyro-electricity, p. 107; Cumming's experiments, p. 125; diurnal variation due to thermo-electric currents, p. 145.

832. Le Baillif, (Alexandre C. M.) (1764-1831.) Notice sur la construction du sideroscope. (Bull. Sc. Math., Phys. et Chim., Vol. 8, pp. 87-95) 8vo. *Paris, 1827*

Diamagnetic repulsion of bismuth, p. 6. The author recognized in 1827 the diamagnetic property of antimony.

833. Lewis, W(illiam) Greathead. A catechism of electricity. 46 pp. Ill. 16mo. *London, 1827*

834. Mitchell, James. (1786-1844.) First lines of science; or, A comprehensive and progressive view of the leading branches of modern scientific discovery and invention. xi+347 pp. 18 plates. 12mo. *London, 1827*

Two chapters on electricity and magnetism.

—See also 758.

835. Ohm, G(eorg) S(imon). (1787-1854.) Die galvanische Kette, mathematisch bearbeitet. iv+245 pp. pl. 8vo. *Berlin, 1827*

Memorable work containing the rationale of the electric circuit; the fundamental differential equation, p. 112.

Latimer Clark
1867.

AN ESSAY

ON THE

APPLICATION

OF

MATHEMATICAL ANALYSIS TO THE THEORIES OF
ELECTRICITY AND MAGNETISM.

BY

GEORGE GREEN.

Nottingham:

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- 835a.**—(English translation.) The galvanic circuit investigated mathematically. (Translated by William Francis.) (Taylor's Scientific Memoirs, Vol. II, pp. 401-506.) 1 plate. 8vo.
London, 1841
- 835b.**—(French edition.) Théorie mathématique des courants électriques. Traduction, préface et notes de J. M. Gauguin. 202 pp. 8vo.
Paris, 1860
The translation is preceded by a critical preface and by a sketch of the author's life; also valuable notes by the translator, himself a distinguished electrician.
- 835†c.**—(Reprint of Francis translation.) 269 pp. 16mo.
New York, 1891
This reprint is accompanied by a preface and notes by Mr. Thomas D. Lockwood.
—See also 1266.
- 836.** **Pfaff**, J(ohann) W(ilhelm) A(ndreas.) (1774-1835.) Die Umkehrung der voltaischen Pole durch Herrn Pohl, oder die durch seine Philosophie geheilte 25jaehrige Blindheit der Naturforscher. 138 pp. 8vo.
Nuremberg, 1827
Theoretical considerations regarding the voltaic pile.
—See also 665.
- 837.** **Spilsbury**, Francis Gybbon. Extract from a memoir on a peculiar connexion which exists between the magnetism evolved by a single galvanic combination, and the relative magnitude of the opposing surfaces of that combination. (Trans. Cambridge Philos. Soc., Vol. 2, pp. 77-83) 1 plate. 4to.
Cambridge, 1827
Early thermo-electric experiment.
- 838.** **Electricity**. Second edition. (Library of Useful Knowledge) 2 parts. 64 pp. ill. 8vo.
London, 1827-1828
Comprehensive article on electrostatics by Sir William Snow Harris.
—See also 801.
- 838†bis.** **Ampère**, (André Marie.) (1775-1836.) Note sur l'action mutuelle d'un aimant et d'un conducteur voltaïque. (Extract, Ann. Chem. Phys., 1828.) 29 pp., 1 plate. 8vo. *Paris, 1828*
A mathematical treatment supplementing a previous consideration of the same subject. (See No. 762.)
—See also 762.
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- 840.** **Green**, George. (1793-1841.) An essay on the application of mathematical analysis to the theories of electricity and magnetism. viii+72 pp. 4to.
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—See also 1801.

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841. Harris, (Sir) W(illiam) S(now.) (1792-1867.) Experimental inquiries on electrical accumulation. (Extract, Trans. Plymouth Institution) 53 pp. 4 plates. 4to. *Plymouth, 1828*
Electrical condensation; experiments with Leyden batteries.
—See also 801.
842. Irving, Washington. (1783-1859.) History of the life and voyages of Christoph Columbus. 4 vols. map. 8vo. *London, 1828*
Columbus records change in magnetic declination with change of place, Vol. I, p. 197; St. Elmo's fire, Vol. II, p. 6.
843. La Beaume, (Michael.) Du galvanisme appliqué à la médecine, et de son efficacité dans le traitement des affections nerveuses, avec des notes sur quelques remèdes auxiliaires, traduit de l'anglais et précédé de remarques et d'observations pratiques sur le galvanisme par B. R. Fabre-Palaprat. xxvi+438 pp. 8vo. *Paris, 1828*
Physiological effects of the "galvanic fluid" with numerous practical observations.
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The author's method for finding the direction and intensity of magnetic force at any point on the globe.
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Magnetism and electricity, elementary; Ampère's telegraphy, p. 332.
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Recently discovered electro-magnetic phenomena; effect of solar rays on magnets, observations of Prof. Morichini, Mrs. (Mary Fairfax) Somerville and Mr. Christie, p. 23.
- 847a.—Second edition, revised. 76 pp. ill. 12mo. *London, 1856*
—See also 2678.
848. Exley, Thomas. (?—1855.) Principles of natural philosophy, or, A new theory of physics, founded on gravitation and applied in explaining the general properties of matter, the phenomena of chemistry, electricity, galvanism, magnetism and electro-magnetism. xxxii+478 pp. 4 plates. 8vo. *London, 1829*
Elementary treatment of the subject; aurora borealis, p. 344; table of declination for London and Paris, p. 408; discussion of same, p. 412.

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849. **Fechner**, Gustav Theodor. (1801-1887.) *Lehrbuch des Galvanismus und der Elektrochemie.* xvi+564 pp. 2 plates. 8vo.
Leipzig, 1829
Textbook of current electricity. (Vol. III. of Biot's *Lehrbuch der Experimental Physik*.)
—See also 859, 865, 892.
850. **Muncke**, G(eorg) W(ilhelm). (1772-1847.) *Handbuch der Naturlehre.* 2 vols. 8vo.
Heidelberg, 1829-1830
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—See also 759.
851. **Pope**, William. *Triumphal chariot of friction; or, A familiar elucidation of the origin of magnetic attraction, etc.* vii+108 pp. 12 plates. 4to.
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Vol. II of this book on the wonders of magic contains references to the mariner's compass among the Chinese, the Greeks and the Finns.
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Life and work of Volta.
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Edinburgh, 1830
A chapter on "matter" and another on the "radiant medium".
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London, 1830
856. **Murray**, John. (1786?-1851.) *Treatise on atmospherical electricity; including lightning rods, and paragrèles.* 149 pp. 1 plate. 8vo.
London, 1830
Historical sketch, lightning conductors; precautions for personal safety; lambent (electric) flames, p. 38; meteorites, p. 44; electric discharges and volcanic eruptions; ascent of the spider, p. 74.
- 856a. — *Nouveau manuel complet de l'électricité atmosphérique.* Translated by A(natole) Riffault. (Manuels-Roret.) vi+264 pp. 3 plates. 16mo.
Paris, (1874)
Treatise on atmospheric electricity to which are added notes on dew, hail and lightning-rods.
—See also 880.
857. **Perrot**, A. M. (1795-?.) *La conquête d'Alger; ou Relation de la Campagne d'Afrique, comprenant les motifs de la guerre, les détails des préparatifs de l'expédition et des événements qui ont précédé le débarquement, la composition de l'armée de terre et de l'armée navale, les noms des officiers supérieurs et*

dant pas un mot à la question , la jugèrent comme auraient fait les juges du quinzième siècle, et condamnèrent M. de Visserly à démolir la flèche malencontreuse. M. de Visserly ne se tint pas pour battu ; il vint me consulter, et je l'engageai fortement à se pourvoir, par appel , pour faire réformer ce ridicule jugement. Je fus chargé de le défendre devant le conseil supérieur. Comme il s'agissait d'une thèse qui occupait alors tous les esprits , je voulus appeler sur la cause l'attention publique , persuadé que mes juges hésiteraient à heurter de front l'opinion qui commençait déjà à être une puissance , quelque velléité qu'ils éprouvassent de suivre l'ornière de la routine. Je publiai un mémoire que je fis répandre avec profusion à Arras et à Paris. J'y traitai la question légale ; mais surtout , ce qui était une innovation dans notre barreau de province , je m'occupai de la question physique que j'examinai sous toutes ses faces. Mon mémoire fut goûté et me valut des lettres flatteuses de la part des hommes les plus distingués dans les sciences. Dès-lors ma cause fut gagnée , et le succès de l'audience me devint facile. Par son arrêt du 31 mai 1783 , la Cour réforma le jugement des échevins de Saint-Omer, et permit à M. de Visserly de rétablir son paratonnerre.

Cette affaire acheva ma réputation , et l'étendit même hors des limites de ma ville natale ; le car-

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un précis des operations militaires, d'après les documents officiels et particuliers, recueillis et mis en ordre par A. M. Perrot. vii+145 pp. maps. 8vo.

Paris, 1830

Account of the conquest of Algiers by the French in 1820.

858. **Robespierre**, Maximilien (Marie Isidore de.) (1758-1794.) Mémoires authentiques. 2 vols. portr. 12mo. *Brussels, 1830*
Interesting defense Vol. 1, p. 167, of the lightning-rod by the French revolutionist. When a young lawyer he successfully defended a client who had been prosecuted for erecting a lightning-rod on his house, the charge being that the act was irreligious. The University of Pennsylvania has a letter from Robespierre to Franklin transmitting a copy of the plea. While apocryphal, this work (written by C. Reybaud) is reliable in its statements.

859. **Fechner**, Gustav Theodor. (1801-1887.) Massbestimmungen ueber die galvanische Kette. xii+260 pp. 1 plate. 8vo.

Leipzig, 1831

Inquiry into the nature and measurement of the electric current with numerous examples.

—See also 849.

860. **Hansteen**, (Christopher.) (1784-1873.) Ueber die magnetische Intensitaet der Erde. (Astronomische Nachrichten, Vol. 9, pp. 303-315) 1 map. 4to.

Altona, 1831

Short paper on the magnetic intensity of the earth with remarks on methods of determining it, accompanied by chart of isodynamic lines.

—See also 756.

861. **Paris**, John Ayrton. (1785-1856.) Life of Sir Humphry Davy. xv+547 pp. portr. 4to.

London, 1831

Account of Davy's Bakerian lectures and electrical work.

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Berlin, 1831

This thesis discusses the daily and monthly variations of the earth's total (magnetic) force and seeks to determine the cause.

—See also 1130, 1783, 2000, 2168, 3250.

863. **West**, Francis. (1810-1868.) The electrician's guide; being a brief outline of the science of electricity. 38 pp. 2 plates. 16mo.

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Note on the progress of medical electricity.

864. **Belli**, Giuseppe. (1791-1860.) Riflessioni sulla legge dell'attrazione molecolare. 23 pp. 4to.

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The laws of molecular not the same as that of molar attraction; Laplace criticized.

—See also 899, 916, 3049.

865. **Fechner**, Gustav Theodor. (1801-1887.) Repertorium der Experimentalphysik enthaltend eine Zusammenstellung der neueren Fortschritte dieser Wissenschaft. (Als Supplement zu neueren Lehr- und Woerterbuechern der Physik.) 3 vols. 10 plates. 8vo.

Leipzig, 1832

Extensive treatment of electricity and magnetism with bibliography of the subject.

—See also 849.



867. GAUSS. (See No. 4377.)

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866. **Julia-Fontenelle**, Jean Sébastien Eugène de. (1790-1842.) Manuel de physique amusante; ou nouvelles récréations physiques. 4. edition. 460 pp. pl. 16mo. *Paris, 1832*
Recreative experiments in physics.
867. **Gauss**, Karl Friedrich. (1777-1855.) Intensitas vis magneticæ terrestris ad mensuram absolutam revocata. (Comment. Soc. Sc. Goettingen, Vol. 8, pp. 3-44) 4to. *Gottingen, 1832*
Classical memoir on the measurement of magnetic force; a translation will be found in Taylor's *Scientific Memoirs*.
—See also 905, 920.
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Local attraction, p. 61; magnetic intensity at different heights from ground, p. 87; magnetic influence of light, p. 97. By the author of the well-known Roget's *Thesaurus*.
—See also 873, 2611.
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The parts on electricity and magnetism (Sections 5-8), were written by Dr. Peter Mark Roget.
—See also 871.
874. **The Spectator**. xiv+918 pp. pl. 8vo. (Reprint, 1711.) *London, 1832*
Strada's sympathetic needles and allusion to magnetic telegraphy, p. 345. (See No. 90.)

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- 874a.——2 pp. (MS. copy of the article on Strada's needles.) Folio.
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Electrification a source of heat, p. 382.
—See also 1062, 1236, 1286, 1323, 1395, 1681, 1915.
877. **Lenz, (Heinrich) F(riedrich) E(mil).** (1804-1865.) Ueber die Leitungsfähigkeit der Metalle fuer die Electricitaet bei verschiedenen Temperaturen. (Mém. Acad. Sc. Ser. II., Vol. 2, pp. 631-656.) 4to.
St. Petersburg, 1833
Variation of electric conductivity with temperature.
—See also 937.
878. **Metcalf, Samuel L.** (also Metcalfe). (1798-1856.) New theory of terrestrial magnetism. (Read before The New York Lyceum of Natural History.) 158 pp. 8vo.
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The theory is that "Caloric" is the cause of atmospheric electricity, gravitation, magnetic polarity etc.
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Twenty pages on the elements of static and current electricity.
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Comprehensive treatise on electricity and magnetism, theoretical, practical and historical. Vol. 1 deals with the history of the subject; Vol. VI, Part 2, is devoted to terrestrial magnetism. The first thorough treatise on modern electricity.
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An effort is made to explain the motion of the heavenly bodies on the supposition that they consist of electro-magnetic matter; magnetic action of ultra-violet light, p. 3.

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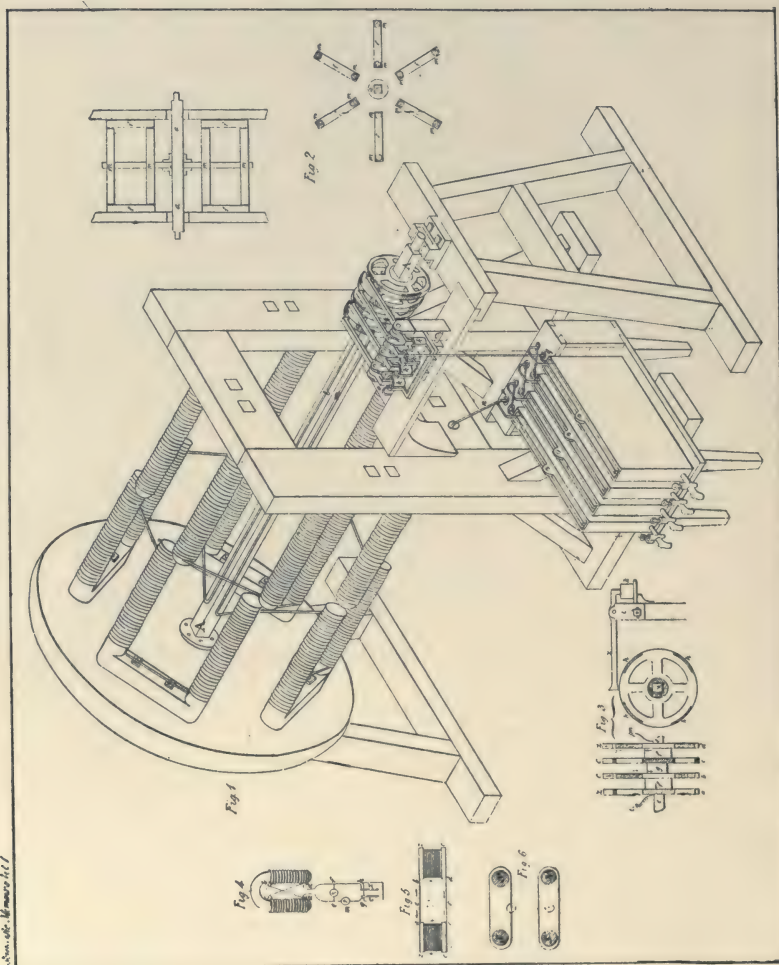
884. **Enschede**, Wilhelm Adrian. De calore qui excitatur electricitate quam annuente summo numine. (Inaugural dissertation) 77 pp. 4to. *Leyden, 1834*
Thesis on the heat due to electric discharge.
885. **Higgins**, W(illiam) Mullinger. Alphabet of electricity for the use of beginners. viii+116 pp. ill. 12mo. *London, 1834*
Interesting from its historical references. The author neglects electro-magnetism, the work of Oersted, Arago and Faraday receiving no notice.
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Important contribution to the history of the magnetic compass on land and sea.
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Bibliography of the telegraph; electric telegraph for railroad purposes.
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No reference to electricity or magnetism.
890. **Somerville**, (Mrs.) Mary (Fairfax.) (1780-1872.) On the connexion of the physical sciences. 458 pp. 12mo. *London, 1834*
This well-known work contains chapters on electricity, magnetism and currents due to rotation; supposed magnetic effect of violet light.
- 890a.—Eighth edition. xvi+524 pp. ill. 5 plates. 12mo. *London, 1849*
—See also 2613.
891. **Barlow**, James. A new theory, accounting for the dip of the magnetic needle, being an analysis of terrestrial magnetism, with a solution of the lines of variation and no variation, and an explanation of the nature of a magnet. xxvii+183 pp. 1 map, 1 plate. 8vo. *New York, 1835*
The theory here advanced is that "caloric" is the cause of polarity.
892. **Fechner**, Gustav Theodor. (1801-1887.) De nova methodo magnetismum explorandi, qui per actionem galvanicam in ferro ductili excitatur. (Inaugural dissertation) 25 pp. 4to. *Leipzig, 1835*
Magnetism induced in needles by the passage of a current through a surrounding coil.

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- 893.—De variis intensitatem vis galvanicae metiendi methodis. (Inaugural dissertation.) 32 pp. 4to. *Leipzig, 1835*
The three methods given for measuring magnetic force are by deflection, torsion, and oscillation.
—See also 849.
894. Gherardi, Silvestro. (1802-1879.) De quadam appendice ad galvanometrum multiplicans, et de ejus usu in profluviiis variis ac praecipue Faradayeis expendendis. (Extract, Act. Acad. Scient. Instit. Bonon. Vol. 3) 42 pp. 4to. *Bologna, 1835*
Dissertation on the use of the galvanometer for comparison of currents of various origin i. e. thermo-electric, voltaic, magneto-electric.
—See also 929, 1571, 1595, 1720, 1742, 1798, 1831, 1865, 1976, 3130.
895. Hare, Robert. (1781-1858.) A brief exposition of the science of mechanical electricity. 48 pp. ill. 8vo. *Philadelphia, 1835*
Elementary electrostatic phenomena.
—See also 683.
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Remarks on magnetic dip, pp. 117, 118, 131, 381; table of dip observations, p. 566; north magnetic pole, p. 556; location of pole, p. 567; aurorae, p. 223.
—See also 2714.
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Note on the electric properties of pointed conductors.
—See also 864.
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—See also 2516.
901. Davy, Edward. (1806-1885.) An experimental guide to chemistry. iv+98 pp. 1 plate. 12mo. *London, 1836*
Presentation copy, with letter, from Henry Davy, uncle of the author.
—See also 4988.

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Geneva, 1836
Denies the contact and defends the chemical theory of the voltaic cell.
—See also 818.
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Work on general physics, especially electricity and magnetism.
—See also 1155, 2898.
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Work on general physics written while the author was Professor in the Polytechnische Schule, Karlsruhe.
- 904a.—Third edition. vi+664 pp. 10 plates. 8vo. *Mannheim, 1841*
—See also 1672.
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—See also 867.
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—See also 683.
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—See also 933, 938, 982, 1046, 1362, 1394, 1837.
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—See also 1119.

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This is the second edition of a standard work on physics; it contains a chart showing the position of the magnetic equator as determined from the observations of Duperrey, 1822-1825.

—See also 1908, 3469.

913. Rijke, P(ieter) L(eonhard.) (1812-1901.) De origine electricitatis voltaicae. 81 pp. 4to. (Inaugural dissertation.)
Maastricht, 1836

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—See also 3202.

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IN

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"The nervous agent and the electrical agent are two principles perfectly identical", p. 12.
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Résumé of the electrical knowledge of the ancients, p. 237; the lapis lynceus, p. 232; shock of the torpedo, p. 233.
974. **Cantu, Cesare.** (1807-1895.) *Notizia di G. D. Romagnosi, con l'aggiunta di alcuni opuscoli intorno alla vita ed alle opere del medesimo.* 2. edition. 238 pp. 8vo. *Prato, 1840*
Romagnosi of Trent noticed in 1802 that an insulated electrode of a voltaic pile affects a neighboring compass, p. 182, (see *Izarn* No. 664, *Govi* No. 1744, *Tommasi* No. 2301.)
975. **Clément-Mullet, J. J.** *Sur les bélemnites, les pierres de foudre et les aérolithes.* 25 pp. 8vo. *Troyes, 1840*
Remarks on *lyncurium* and *fulgurites*.
976. **De la Rive, Auguste (Arthur.)** (1801-1873.) *Notice sur un procédé électro-chimique ayant pour objet de dorer l'argent et le laiton.* (*Biblioth. Univers. Sc. Genève*, Vol. 25, pp. 407-422) 8vo. *Geneva, 1840*
New process for electro-plating silver and tin with gold.
- 976a—(German translation.) (*Journ. Prakt. Chemie*, Vol. 20, pp. 157-172) 8vo. *Leipzig, 1840*
—See also 818.
977. **Flaugergues, (Pierre Paul.)** (1810-1844.) *Des machines électrodynamiques.* (*Bull. Soc. Sc. Toulon*, 1840, pp. 221-246) 1 plate. 8vo. *Toulon, 1840*
An electric motor for navigation purposes; Jacobi's trial on the Neva.
978. **Guyot, Jules.** (1807-1872.) *De la télégraphie de jour et de nuit.* xv+214 pp. 3 plates. 8vo. *Paris, 1840*
Signaling; semaphore by day and lamps by night.
979. **Haldat du Lys** (Charles Nicolas Alexandre) de (1770-1852.) *Recherches sur quelques phénomènes du magnétisme, le fantôme magnétique, et sur la diffraction complexe.* (*Extract. Mém. Soc. Sc. Nancy*, 1839.) 45 pp. 8vo. *Nancy, 1840*
Notes on the curved lines of force of a magnetic field.

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- 980.—Recherches sur quelques phénomènes produits par les forces attractives et répulsives des aimants. (Mém. Soc. Sc. Nancy, 1839, pp. 42-76) 8vo. *Nancy, 1840*
The magnetic field due to various combinations of magnets; magnetic and electrodynamic phenomena compared.
—See also 1000, 1075, 1097, 1229, 2765.
981. **Hehl**, (Johann.) (1802—?) Ueber elektro-dynamische Vertheilung. 23 pp. 1 plate. 4to. (Programm.) *Cassel, 1840*
Short paper on electro-dynamic induction.
982. **Jacobi**, Moritz Hermann von. (1801-1874.) Die Galvanoplastik, oder das Verfahren cohaerentes Kupfer in Platten oder nach sonst gegebenen Formen unmittelbar aus Kupferausloesungen auf galvanischem Wege zu produciren. Nach dem auf Befehl des Gouvernements in Russischer Sprache bekannt gemachten Originale. viii+63 pp. 1 plate. 8vo.
St. Petersburg & Berlin, 1840
Historical work on electrotyping: the author's method of obtaining electro-types. (See No. 986, 1036.)
- 982a.—(English translation.) Galvanoplastik; or, The process of cohering copper into plates by means of galvanic action on copper solutions, translated from the German edition by William Sturgeon. vi+39 pp. 1 plate. 8vo.
Manchester, 1841
—See also 907.
983. **Knox**, George J. On the direction and mode of propagation of the electric force traversing interposed media. 9 pp. 4to.
Dublin, 1840
Facts tending to reconcile the contact with the chemical theory.
984. **M'Gauley**, James William. (?-1867.) Lectures on natural philosophy. x+400 pp. ill. 8vo. *Dublin 1840*
Elementary work; four chapters on electricity and magnetism.
- 984a.—New edition, enlarged and improved. 2 vols. 8vo.
Dublin, 1850
985. **Matteucci**, C(arlo.) (1811-1868.) Essai sur les phénomènes électriques des animaux. 88+111 pp. 2 plates. 8vo. *Paris, 1840*
The electric organ of the torpedo with illustrations.
—See also 1025, 1064, 1288, 1422, 1527, 1599, 1684, 2728.
986. **Netto**, F(riedrich) A(ugust) W(ilhelm.) (1783-?) Anweisung zur Galvanoplastik. 64 pp. 2 plates. 8vo.
Quedlinburg & Leipzig, 1840
Early work on electrolytic deposition giving a *résumé* of the discoveries and work of Spencer, Jacobi and Kobell. (See Nos. 982, 990, 1021.)
987. **Peltier**, (Jean Charles) Athanase. (1785-1845.) Météorologie; observations et recherches expérimentales sur les causes qui concourent à la formation des trombes. xvi+444 pp. 3 plates. 8vo.
Paris, 1840
The formation of hail, water-spouts, tornadoes and similar phenomena; also the part played by electricity in their origin and development.
—See also 944.

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988. **Roberts, Martin, J.** The process of blasting by galvanism. 36 pp. 3 plates. 8vo. *London, 1840*
Wire imbedded in the charge brought electrically to incandescence.
989. **Schoenbein, C(hristian) F(riedrich).** (1799-1868.) Beobachtungen ueber den bei der Elektrolyse des Wassers und dem Ausstroemen der gewoehnlichen Elektricitaet aus Spitzen sich entwickelnden Geruch. 24 pp. 4to. *Basle, 1840*
Electrolysis of water; odors accompanying electric discharges; ozone.
—See also 1051, 1301, 2732.
990. **Spencer, Thomas.** (?-1857.) Instructions for the multiplication of works of art in metal by voltaic electricity. With an introductory chapter on electro-chemical decompositions by feeble currents. 62 pp. ill. 8vo. *Glasgow, 1840*
Electrolytic deposition. The forces termed chemical affinity and electricity are one and the same, p. 2. (See Nos. 986, 1036.)
991. **Thomson, Thomas.** (1773-1852.) Outline of the sciences of heat and electricity. Second edition. xiv+585 pp. pl. 8vo. *London, 1840*
Davy anticipated Ohm, p. 379; magnetic chart for 1829.
- 991[†]bis. **Weyde, P. H. van der.** (1813-1895.) Tijdschrift voor de wisen natuurkunde ten doel hebbende: de meerdere verspreiding van eene grandige natuurkennis, volgens het tegenwoordige standpunt der wetenschap. Years I to IV (all published). (Year IV, entitled: Tijdschrift to natuurkunde.) 306+320+344+156 pp. 10 plates. 12mo. *Zieriksee & Amsterdam, 1840-1843*
Collection of short treatises on electrical subjects written for the non-mathematical reader.
—See also 3267.
992. **Vorsselman de Heer, P(ieter) O(tto) C(oenraad).** (1809-1841.) Recherches sur quelques points d'électricité voltaïque. (Bull. Sc. Phys. et Natur. Néerlande, 1840, pp. 105-148) 1 plate. 8vo. *Utrecht, 1840*
Chemical theory of the voltaic battery.
—See also 970.
993. **Weinlig, Chr(istian) A(lbertus).** (1812-1873.) Examen theoriae electrochemico-atomistico. 41 pp. 8vo. *Leipzig, 1840*
The atomic theory of matter and the chemical effects of the electric current.
994. **Royal Society of London.** Report of the Committee of Physics and Meteorology of the Royal Society of London relative to the observations to be made in the Antarctic expedition and in the magnetic observatories. 119 pp. 4 maps. 8vo. *London, 1840*
Instructions relating chiefly to the measurement of the magnetic elements, to meteorological phenomena, and ocean currents.
- 994a.— —Revised instructions for the use of magnetic and meteorological observatories and for the magnetic surveys. 44 pp. 8vo. *London, 1842*
Description of standard magnetic instruments and methods of using them.

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995. **Bain, Alexander.** (1818-1877.) A treatise on numerous applications of electrical science to the useful arts. Part I. contains early notions of electric telegraphy, and a description of the first printing telegraph. 36 pp. ill. 8vo. *Edinburgh, (1841)*
Early telegraphs; the author's printing telegraph. (See No. 1040.)
—See also 121bis., 1220, 1404, 3488.
996. **De la Rive, A(uguste) (Arthur.)** (1801-1873.) Coup d'oeil sur l'état actuel de nos connaissances en électricité. (Biblioth. Univ. Suppl. Arch. l'Électr. Vol. I., pp. 1-30.) 8vo.
Geneva, 1841
Brief review of electric discovery down to 1840.
—See also 818.
997. **Diderot, (Denis.)** (1712-1784.) Mémoires, correspondance et ouvrages inédits, publiés d'après les manuscrits confiés, en mourant, par l'auteur à Grimm. 2 vols. 12mo. *Paris, 1841*
Curious anticipation of the printing telegraph, Vol. 1, p. 279.
998. **Franceschi, Giovanni.** La elettricità animale nuovo elemento filosofico della medicina. 96 pp. 8vo. *Ancona, 1841*
The effects of electricity on the animal organism.
- 999.† **Galvani, Luigi.** (1737-1798.) Opere edite ed inedite del Prof. Luigi Galvani, raccolte e pubblicate per cura dell' Accademia delle Scienze dell' Istituto di Bologna. 51+505 pp.+58 pp. (Supplement) 8 plates. portr. 4to. *Bologna, 1841-1842*
This volume contains the published papers of Galvani together with two others hitherto inedited.
—See also 570.
1000. **Haldat du Lys, (Charles Nicolas Alexandre) de.** (1770-1852.) Recherches sur la cause du magnétisme par rotation. (Mém. Soc. Sc., Nancy, 1840, pp. 59-69) 8vo. *Nancy, 1841*
Acquisition of magnetic properties by all bodies.
- 1001.—Recherches sur la généralité du magnétisme, ou complément aux expériences de Coulomb. (Mém. Soc. Sc., Nancy, 1840, pp. 70-87) 8vo. *Nancy, 1841*
Experiments of Arago, Faraday, Herschel and Babbage; discussion of observations.
—See also 979.
1002. **Henry, Joseph.** (1797-1878.) Contributions to electricity and magnetism. No. IV. On electro-dynamic induction. (Trans. Amer. Philos. Soc., Vol. 8, pp. 1-36) ill. 4to. *Philadelphia, 1841*
Three papers on electro-dynamic phenomena.
—See also 1392, 1941, 2410, 2667.
1003. **Quetelet, (Lambert) A(dolphe Jacques.)** (1796-1874.) Résumé des observations sur la météorologie, sur le magnétisme, sur les températures de la terre, la floraison des plantes. (Mém. Acad. Sc., Belgique, Vol. 14) 78 pp. 4to. *Brussels, 1841*
Short memoir containing observations of magnetic dip and declination made in the year 1840.
—See also 968.

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1004. **Reinsch**, (Edgar) Hugo (Emil). (1809-1884.) Versuch einer neuen Erklärungsmaschine der elektrischen Erscheinungen viii+120 pp. 12mo. *Nuremberg, 1841*
The author's view on certain fundamental phenomena of electricity.
—See also 3006.
1005. **St. Agobard**, (also Agoberd, Agobold.) (779-840.) De la grêle et du tonnerre. (Traduit par Ant. Péricaud, l'ainé.) 55 pp. 8vo. *Lyons, 1841*
Latin text with French translation in juxtaposition; very rare tract on certain popular prejudices or superstitions of the time concerning storms, hail and related phenomena. The author lived in the 9th century, and was Archbishop of Lyons and one of the most distinguished men of his age and country. This is the first edition; a second edition was published the same year.
1006. **Smee**, Alfred. (1818-1877.) Elements of electro-metallurgy; or the art of working in metals by the galvanic fluid. xxviii+163 pp. 1 plate. 8vo. *London, 1841*
Brief history, early batteries, application to the arts, by the inventor of the "Smee" battery.
- 1006a.—Second edition. xxx+338 pp. ill. 8vo. *London, 1843*
—See also 1030, 1165, 1216.
1007. **Walker**, Charles V(incent.) (1811-1882.) Electrotype manipulation; being the theory and plain instructions in the art of working in metals by precipitating them from their solutions through the agency of galvanic or voltaic electricity. 2 parts. iv+44+iv+44 pp. ill. 12mo. *London, 1841*
Manual of instructions for workers in electro-metallurgy which passed through numerous editions. One or both parts of the following editions are also in the Library: Editions 2, 3, 4, 5, 9, 10, 12, 13, 14, 16, 18, 19, 21, 32; 1841-1850.
—See also 1062, 2811.
1008. **Avogadro**, (Amedeo) (Conte de Quaregna). (1776-1856.) Note sur la nature de la charge électrique. (Biblioth. Univ. Suppl. Arch. l'Électricité. Vol. 2, pp. 102-110.) 8vo. *Geneva, 1842*
—See also 951.
1009. **Buff**, H(einrich.) (1805-1878.) Der Zusammenhang der neueren Elektricitaetslehre mit der Contact-theorie. 13 pp. 8vo. *Giessen, 1842*
The theory of the voltaic cell.
- 1010.—Sur le rang de l'hydrogène dans la série de la tension électrique. (Extract, Ann. Chem. Phys. Vol. 41.) (Biblioth. Univ. Suppl. Arch. l'Électricité. Vol. 2, pp. 222-226.) 8vo. *Giessen, 1842*
Position of hydrogen in the electropotential series of chemical elements.
—See also 1199, 3120.
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Shows how safety and punctuality can be secured on single railway-lines by means of electric telegraph.

—See also 1384, 3993.

1012. **Davis, Daniel.** Manual of magnetism, including also electro-magnetism, magneto-electricity, and thermo-electricity. With a description of the electro-type process. viii+218 pp. ill. 8vo

London, 1842

Suggestive, experimental handbook. Has been cited in transformer litigation owing to the treatment in detail of the Ruhmkorff coil.

- 1012a.—Second edition. viii+322 pp. ill. 12mo. *Boston, 1848*

- 1012b.—Seventh edition. viii+322 pp. ill. 8vo. *Boston, 1855*

—See also 5510.

1013. **Dellmann, (Johann) F(riedrich Georg.)** (1805-1870.) Ueber ein neues Elektrometer. 24 pp. 4to. *Coblenz, 1842*

The author's electrometer and its uses.

—See also 1512.

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The erection of lightning-conductors; written as a guide for architects.

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The electro-motor invented by Elias of Amsterdam in 1842 marks an era in the practical application of electricity. See Sturgeon's "Annals" and Dredge's *Electric Illumination*. (See No. 2276.)

—See also 1517.

1016. **Friese, Robert.** Theoria galvanismi. 80 pp. 8vo. (Inaugural dissertation.) *Bonn, 1842*

Dissertation on the general phenomena of currents.

1017. **Grove, (Sir) W(illiam) R(obert.)** (1811-1896.) Lecture on the progress of physical science since the opening of the London Institution. 46 pp. 8vo. *London, 1842*

Review of the work of Oersted, Ohm and Seebeck.

—See also 1096, 2802.

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Experimental study of the weakening of the magnetic moment of magnets.

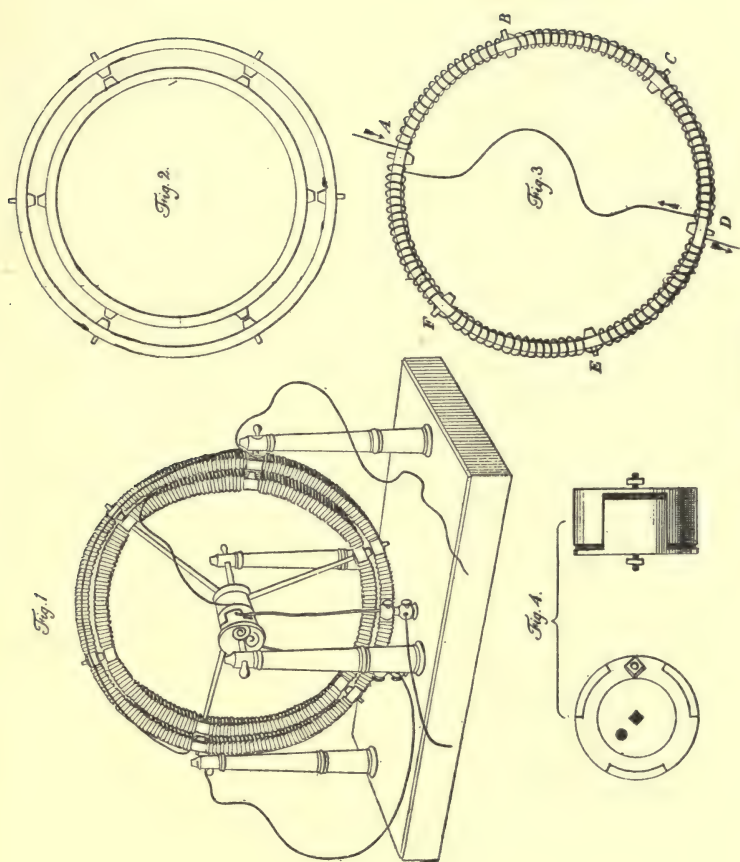
—See also 756.

- 1019.* **Harris, (Sir) W(illiam) Snow.** (1792-1867.) Protection from lightning. (Extract, Nautical Mag. 1842) 10 pp. 12mo.

London, 1842

Instances of damage done to men-of-war by lightning; advocacy of the method of protection devised by the author.

—See also 801.



1015. ELIAS. (Reduced.)

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Some practical applications of the electric current.
1021. Kobell, (Wolfgang Xaver) Franz von. (1803-1882.) Die Galvanographie, eine Methode gemalte Tuschbilder durch galvanische Kupferplatten im Drucke zu vervielfaeltigen. 18 pp. 7 plates. 4to. *Munich, 1842*
Galvanography, or the art of reproducing pictures by means of the electric current. (See No. 986.)
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Current strength as affected by the arrangement of the cells in the battery, joint resistance of the conductors in circuit, etc.
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—See also 1420, 1916, 2035, 2710.
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Some phenomena of current induction.
—See also 1063, 3241.
1025. Matteucci, C(arlo). (1811-1868.) Observations sur un mémoire de M. Vorsselman de Heer, relatif à des expériences thermo-électriques. (Biblioth. Univers. Suppl. Arch. l'Électricité, Vol. 2, pp. 227-230) 8vo. *Geneva, 1842*
—See also 985.
1026. Peltier, J(ean) C(harles) A(thanase). (1785-1845.) Recherches sur la cause des phénomènes électriques de l'atmosphère, et sur les moyens d'en recueillir la manifestation. 49 pp. 1 plate. 8vo. *Paris, 1842*
Presence and effect of water-vapor in the atmosphere; causes of the electrification of the atmosphere; clouds positively and negatively charged.
—See also 944.
1027. Poggendorff, J(ohann) C(hristian). (1796-1877.) Méthode pour déterminer la force électromotrice dans les courants voltaïques à force non constante. (From Ann. Phys. Chem. Vol. 54) (Biblioth. Univers. Suppl. Arch. l'Électricité, Vol. 2, pp. 5-35.) 8vo. *Geneva, 1842*
- 1027a. — Méthode pour déterminer le rapport entre le maximum d'intensité de deux courants voltaïques. (From Ann. Phys. Chem. Vol. 54.) (Biblioth. Univers. Suppl. Arch. l'Électricité, Vol. 2, pp. 196-221) 8vo. *Geneva, 1842*
—See also 1103, 1333, 1691, 1752, 1781, 1950, 2782.
1028. Sampson, Thomas. Electrotint; or, The art of making paintings in such a manner that copper plates and blocks can be

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- taken from them by means of voltaic electricity. 26 pp. 3 plates. 8vo. *London, 1842*
Producing drawings or paintings so that copper plates for printing can be made from them by the electrotype process. (See No. 4995.)
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- 1029a.—Second edition, enlarged. iv+202 pp. pl. 8vo. *London, 1844*
1030. Smee, Alfred. (1818-1877.) New definition of the voltaic circuit. (Reprinted from "Elements of electro-metallurgy," pp. 187-204) 19 pp. 8vo. *London, 1842*
Daniell, Grove and Smee cells considered. (Autograph copy.)
- 1031.—On the intimate rationale of the voltaic force. (Reprinted from "Elements of electro-metallurgy," pp. 307-328) 22 pp. 8vo. *London, 1842*
Electricity is not a *thing*, it is a *vibration*.
—See also 1006.
1032. Sturgeon, William. (1783-1850.) Lectures on electricity, delivered in the Royal Victoria Gallery, Manchester during the years 1841-1842. xi+240 pp. 1 plate. 12mo. *London, 1842*
Comprehensive popular treatment by the notable English electrician.
—See also 925.
1033. Wartmann, Elie (François.) (1817-1886.) Sur les relations qui lient la lumière à l'électricité, lorsque l'un des deux fluides produit une action chimique. (Biblioth. Univers. Suppl. Vol. 2, Arch. d'Électricité, pp. 596-600.) 8vo. *Geneva, 1842*
The question is asked: "Is light converted into electricity?" (Autograph copy, dedicated to Faraday).
—See also 1088, 1138, 2889.
1034. Wetzler, J(ohann) E(vangelist.) (1774—?) Beobachtungen ueber den Nutzen und Gebrauch des Keil'schen magnet-elektrischen Rotations-Apparatus in Krankheiten, besonders in chronisch-nervoesen, rheumatischen und gichtischen, gesammelt zu Muenchen, Augsburg, Wuerzburg und Kissingen. 184 pp. 8vo. *Leipzig, 1842*
Instances from the author's practise of the effective application of the electric current to the cure of diseases.
1035. Arrott, Alexander R. On some new cases of voltaic action, and on the construction of a battery without the use of oxidisable metals. (Mem. Chem. Soc. Vol. 1, pp. 142-150) 8vo. *London, 1843*
The conclusion of the paper is that chemical action is the result of the tendency of the molecules of the electrolyte to arrange themselves in a state of equilibrium.
1036. Boquillon, (Nicolas.) De l'électrotypie. (Extract, Revue Scient. Indust.) 58 pp. 8vo. *Paris, 1843*
Account of the author's researches on electrotyping with allusions to the work of Jacobi, Spencer and others. (See Nos. 982, 990.)

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1037. **Botto**, (Giuseppe Domenico). (1791-1865.) Expériences sur les rapports entre l'induction électro-magnétique et l'action électrochimique suivies de considérations sur les machines électro-magnétiques. (Mem. Accad. Sc. Torino, Ser. II., Vol. 5, pp. 239-261) 4to. *Turin, 1843*
Comparison of the electrochemical and electromagnetic effects of a Grove battery.
—See also 951.
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Hypnotism with a few allusions to personal magnetism. The writer was a pioneer of the modern school of hypnotism.
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Magnetism and electricity compared with regard to their nature and effects.
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The first two parts of a controversial character; part III. notices the earlier applications of electro-magnetism and is followed by a chronological table extending from 1816 to 1843. Also newspaper article on Bain, by Professor Tait. (See No. 995.)
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Account of the works of Brunetto Latini, poet and philosopher who died in 1294. Reference to the mariner's compass, p. 20.
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Thesis in which the sources and effects of dynamic electricity are discussed; electric fishes, muscular currents, electro-therapeutics.
—See also 1390, 1519.
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shipping against the destructive effects of lightning. xvi+226 pp. ill. 8 plates. 8vo. *London, 1843*

This work contributed greatly to the adoption in England of lightning conductors for the protection of houses and ships; besides the 8 plates, there are 52 illustrations.

—See also 801.

1044. **Hesse, Julius** (Ostwald.) Erfahrungen und Beobachtungen ueber die Anwendung des magneto-elektrischen Rotations-Apparates bei verschiedenen Krankheiten. iv+95 pp. 12mo.

New-Brandenburg, 1843

Magneto-electric machine for medical purposes.

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General principles of physiology followed by an account of the part played by electricity in the treatment of disease.

1046. **Jacobi, Moritz Hermann von.** (1801-1874.) Bericht ueber die Entwicklung der Galvanoplastik. (Bull. Acad. Sc. Cl. Physico-Math. St. Petersburg, Vol. I., pp. 65-71.) 8vo.

St. Petersburg, 1843

Two papers on electrotyping processes, 1842.

- 1047.—Bericht ueber die galvanische Vergoldung. (Bull. Acad. Sc. Cl. Physico-Math., Vol. I., pp. 72-78.) 8vo. *St. Petersburg, 1843*
Paper of historical interest on goldplating.

- 1048.—Extrait d'une lettre de M. le Prof. Jacobi à Dorpat à M. Lenz. (Article written in German.) (Biblioth. Univers. Suppl. Arch. l'Électricité, Vol. 3.) 7 pp. 1 plate. 8vo. *Geneva, (1843)*

Research connected with Daniell's battery.

—See also 907.

1049. **Lamont, (Johann) von.** (1805-1879.) Bestimmung der Horizontal-Intensitaet des Erdmagnetismus nach absolutem Maase. (Abh. Bayer. Akad. Wiss. Math.-Nat. Kl. Vol. 3, pp. 621-670+ 1 p. additions in MS.) 1 plate. 4to. *Munich, 1843*

Theory of the method of determining the horizontal component of the earth's magnetism in absolute measure.

—See also 1208, 1364, 1491, 1679, 2803.

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London, 1843

The observations tabulated at Toronto, St. Helena, Van Diemen's Land and the Cape of Good Hope. Some details about aurorae.

—See also 945.

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pointes, pendant l'émission de l'électricité ordinaire. (Biblioth. Univers. Suppl. Arch. l'Électricité, Vol. 3, pp. 295-308.) 8vo.

Geneva, 1843

On the odor produced at the anode during electrolysis of water, and between points during electric discharge; ozone.

—See also 989.

1052. (Sidney, Edwin.) Electricity, its phenomena, laws and results. viii+184 pp. ill. Sm. 4to.

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- 1052a.—New edition. vii+182 pp. 16mo. *London, (1862)*

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—See also 925.

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—See also 950.

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Saarbruecken, 1844

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- 1061a.—Third edition. lxxvi pp. 2 plates. 12mo. *London, 1855*
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—See also 1024.
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—See also 950.
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Brett's printing telegraph.
—See also 1780.
1125. **Plana, G(iovanni Antonio Amedeo.) (1781-1864.)** Intorno alle formole atte a paragonare colla teoria le osservazioni fatte sull' azione che le correnti terrestri esercitano sopra i conduttori voltaici perfettamente mobili, nell' ipotesi che queste correnti fossero di figura circolare. (Giorn. Arcadico, 1847) 38 pp. 8vo. *Rome, 1847*
The magnetic action of the earth on a movable conductor conveying a current.
- 1126.—Sopra le formole matematiche atte a risolvere i problemi relativi all'azione emanata dalle correnti voltaiche circolari. 55 pp. 1 plate. 8vo. *Rome, 1847*
Action of a circular current on an element of a rectilinear current of a mathematical paper.
- 1127.—Sopra una nuova serie d'esperimenti la forza motrice fra due sulla correnti voltaiche situate nel medesimo piano, per il caso in cui sono entrambe circolari, oppure una ellittica e l'altra circolare. (Giorn. Arcadico, Vol. III., pp. 3-40) 8vo. *Rome, 1847*
A mathematical paper.
—See also 1084.
1128. **Portwine, Edward.** The steam-engine from the earliest to the present time, atmospheric railways, the electric printing telegraph and screw propeller. Second edition. 144 pp. ill. 16mo. *London, 1847*
1129. **Regnauld, Jules (Antoine.) (1820-1895.)** De la production de l'électricité dans les êtres organisés; de ses causes, de ses effets, des organes producteurs de l'électricité. 40 pp. 4to. (Thèse.) *Paris, 1847*
Contribution to the theory of animal and vegetable electricity.
—See also 1335, 2977.

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1130. **Riess**, (Peter Theophil.) (1804-1883.) Ueber die Influenzelektricität und die Theorie des Condensators. (Verh. Akad. Wiss. Math.-Nat. Kl. 1847, pp. 465-470) 8vo. *Berlin, 1847*
The theory of condensers.
—See also 862.
1131. **Romershausen**, Elärd. (1784-1857.) Die magneto-elektrische Rotationsmaschine und der Stahlmagnet als Heilmittel, nebst einigen Bemerkungen ueber das Wesen und die Eigenschaften der dabei wirksamen Naturkraefte und ihrer gegenseitigen dynamischen Reactionen. vi+42 pp. 1 plate. 8vo. *Halle, 1847*
Description of a magneto-electric machine as a therapeutic apparatus.
1132. **Rumford**, (Benjamin Thompson) Count. Inventions, improvements, and practice of Benjamin Thompson in the combined character of colliery engineer and general manager; with some particulars relative to Watt's steam engine. viii+133 pp. 2 plates. 8vo. *Newcastle, 1847*
The distinguished author makes no use of the electric current in his inventions.
1133. **Stevenson**, W. F. Most important errors in chemistry, electricity, and magnetism, pointed out and refuted; and the phenomena of electricity and the polarity of the magnetic needle accounted for and explained. Second edition. 68 pp. 8vo. *London, 1847*
The "errors" dwelt on are that water is decomposable, that hydrogen is an elementary body, and that there are two kinds of electricity and magnetism.
1134. **Thomson**, (Sir William) (Lord Kelvin). (1824-1907.) On certain definite integrals suggested by problems in the theory of electricity. (Cambridge and Dublin Math. Journ., Vol. 2, pp. 109-122.) 8vo. *Cambridge, 1847*
The integral refers to the distribution of electricity on an infinite plane, subject to the influence of an electrified point.
- 1135.—On the forces experienced by small spheres under magnetic influence and on some of the phenomena presented by diamagnetic substances. (Cambridge and Dublin Math. Journ. Vol. 2, pp. 230-235) 8vo. *Cambridge, 1847*
A mathematical paper.
- 1136.—On a system of magnetic curves. (Cambridge and Dublin Math. Journ. Vol. 2, p. 240) 8vo. *Cambridge, 1847*
Short mathematical paper giving the equation of a system of magnetic curves due to two small magnetic needles.
—See also 1085.
1137. **Vail**, Alfred. (1807-1859.) American electro-magnetic telegraph; with the reports of Congress, and a description of all telegraphs known, employing electricity or galvanism. 208 pp. ill. 8vo. *Philadelphia, 1847*
Description of historical telegraphs with 81 illustrations; also letters from Morse and Henry. The Morse code, p. 27.

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- 1137a. — (French translation.) Le télégraphe électro-magnétique Américain avec le rapport du Congrès et la description de tous les télégraphes connus, où sont mis en usage l'électricité et le magnétisme. Traduit par H(ypp) Vattemare. 263 pp. ill. 8vo. *Paris, 1847*
- 1137b. — (Italian translation) Le meraviglie delle telegrafia elettrica ossia telegrafo elettro-magnetico-Americano. Opera di Alfr. Vail, tradotta dall' inglese in francese da Ipp. Vattemare e voltata in Italiano da Lorenzo Poletti. Con note ed aggiunte. viii+171 pp. 5 plates. 8vo. *Verona, 1850*
—See also 1087.
1138. Wartman, Elie (François.) (1817-1886.) Troisième mémoire sur divers phénomènes d'induction (Bull. Acad. Sc., Belgique, Vol. 14, pp. 187-204) 1 plate. 8vo. *Brussels, 1847*
The position of spectral lines unaffected by a magnetic field.
- 1138a. — Cinquième mémoire. Sur l'induction. (Bull. Acad. Sc., Belgique, Vol. 15, pp. 268-276.) 1 plate. 8vo. *Brussels, 1848*
The electric current is not due to a process of rectilinear propagation.
—See also 1033.
1139. Behr. Ueber elektrische Telegraphen. 19 pp. 4to. (Programm.) *Königsberg, 1848*
Some considerations about the electric current and its application to telegraphy.
1140. Bird, Golding. (1814-1854.) Elements of natural philosophy; being an experimental introduction to the study of the physical sciences. Third edition. liv+552 pp. ill. 12mo. *London, 1848*
Elementary treatise for use of medical students.
—See also 1153, 2719.
1141. Drescher, L. Die elektromagnetische Telegraphie: oder leichtfassliche und specielle Beschreibung der vorzueglichsten elektromagnetischen Telegraphen-Apparate und die Anwendung derselben in der Praxis. 38 pp. 4 plates. 4to. *Cassel, 1848*
Equipment for electromagnetic telegraphy.
- 1141a. — Second edition. 38 pp. 4 plates. 4to. *Cassel, 1849*
1142. Gregory, Olinthus (Gilbert). (1774-1841). Mathematics for practical men: being a common-place book of pure and mixed mathematics, designed chiefly for the use of civil engineers, architects and surveyors. Third edition, revised and enlarged by Henry Law. xx+392 pp. +118 pp. (Appendix) 13 plates. 8vo. *London, 1848*
Written for the use of architects and engineers.
—See also 738.
1143. Harris, (Sir) W(illiam) Snow. (1792-1867.) Rudimentary electricity, being a concise exposition of the general principles of electrical science, and the purposes to which it has been applied. iv+160 pp. ill. pl. 12mo. *London, 1848*

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- 1143a.—Third edition. vi+195 pp. ill. pl. 12mo. *London, 1853*
This edition contains many references to the (then) unpublished works of Cavendish; Eeles's electrical theory, p. 43.
—See also 801.
1144. **Martin**, William. (1801-1867.) Illustrated natural philosophy being a manual of modern science for schools and families. Sixth edition. x+314 pp. ill. 12mo. *London, (1848)*
Three short chapters on the elements of magnetism and electricity.
1145. **Pohl**, Georg Friedrich. (1788-1849.) Ueber das Wesen der Elektricitaet und Schwere. Offener Brief an H. W. Dove. 40 pp. 8vo. *Breslau, 1848*
Letter to Dr. Dove giving some views on the nature of electricity.
—See also 825.
1146. **Poppe**, (Otto Heinrich) Adolph. (1813-1894.) Die Telegraphie von ihrem Ursprunge bis zur neuesten Zeit, mit besonderer Beruecksichtigung der ausgefuehrten telegraphischen Systeme. iv+75 pp. 8vo. *Frankfort, 1848*
History and use of methods employed in mechanical and optical signaling.
1147. **Rivot**, (Louis Edmond) (1820-1869) and (Edouard) **Phillipps** (1821-1889.) Note sur la conductibilité électrique des principales roches à de hautes températures. (Ann. Mines, Vol. 14, pp. 57-66) 1 plate. 8vo. *Paris, 1848*
Note on the part played by electricity in certain geological formations.
1148. **Robinson**, Th(omas) R(omney.) (1792-1882.) On the effect of heat in lessening the affinities of the elements of water. (Trans. Irish Acad. Vol. 21, pp. 297-310) 4to. *Dublin, 1848*
—See also 1297, 1336, 3144.
1149. **Ronalds**, (Sir) Francis. (1788-1873.) Epitome of the electro-meteorological and magnetic observations, experiments, etc., made at the Kew observatory. 12 pp. 8vo. *Chiswick, 1848*
Occasional notes on atmospheric electricity.
—See also 803.
1150. **Thomson**, (Sir) William (Lord Kelvin.) (1824-1907.) On the mathematical theory of electricity in equilibrium. (Cambridge and Dublin Math. Journ., Vol. 3, pp. 131-148+266-274; Vol. 4, pp. 276-284; Vol. 5, pp. 1-9.) 8vo. *Dublin, 1848-1850*
Distribution of electricity on conducting surfaces; electric images.
—See also 1085.
1151. **Handbook** to the electric telegraph, being a treatise on the construction, nature and powers, of this instrument, with a full account of its origin and progress. Third edition. 30 pp. ill. 12mo. *London, (1848)*
Popular account of the needle telegraph.
1152. **Barlow**, Peter. (1776-1862.) Electro-magnetism. (Encyclopedia Metropolitana, 2nd ed. pp. i-40.) 5 plates. 4to. *London, 1849*
Historical treatment of the subject.
—See also 720.

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1153. **Bird, Golding.** (1814-1854.) Lectures on electricity and galvanism, in their physiological and therapeutical relations delivered at the Royal College of Physicians. Revised and extended. xii+212 pp. ill. 12mo. *London, 1849*
Animal electricity; medical electric apparatus; action of electricity on the various tissues of the body.
—See also 1140.
1154. **Breguet, Louis François Clément** (1804-1883) and **V. de Sére.** Télégraphie électrique, son avenir, poste aux lettres électriques, journaux électriques, suivi d'un aperçu théorique de télégraphie. 75 pp. 8vo. *Paris, 1849*
Telegraphic administration.
—See also 1250, 1575, 2831.
1155. **Despretz, (César Mansuète.)** (1792-1863.) Note sur la fusion et la volatilisation des corps. (Extract, Comptes rendus Acad. Sc. Vol. 28 & 29) 24 pp. 4to. *Paris, 1849*
The volatilization of carbon and other refractory substances in the electric arc.
—See also 903.
1156. **Fairbairn, Thomas.** Truths and tubes on self-supporting principles; a few words in reply to the author of Highways and Dry-ways. 62 pp. 12mo. *London, 1849*
Reply to Sir Francis Head's criticism on the Britannia Bridge, in his Highways and Dryways. (See No. 2902.)
1157. **Head, (Sir) Francis Bond.** (1793-1875.) Stokers and pokers; or The London and North-Western railway, the electric telegraph and the railway clearing house. By the author of "Bubbles from the Brunnen of Nassau." 208 pp. 12mo. *London, 1849*
Short chapter on the London-Slough telegraph.
—See also 1745, 2902.
1158. **Hobbs, J. S.** Sailing directions for the Island and Banks of Newfoundland, with the coast of Labrador, from York Point to Sandwich Harbour, and from Chateaux Bay to Cape Whittle. Compiled from the surveys of Captains Bayfield and Cook, and Lieutenant Bullock. 88 pp. 8vo. *London, 1849*
Geography of the Newfoundland coast.
1159. **Humboldt, Friedrich Heinrich Alexander, von.** (1769-1859.) Cosmos: sketch of a physical description of the universe, translated under the superintendence of Edward Sabine. Seventh edition. 4 vols. 12mo. *London, 1849-1858*
Celebrated work containing the history and physics of several electric and magnetic inventions and discoveries with copious notes by the editor.
—See also 616.
1160. **Krecke, Friedrich Wilhelm Christian.** (1812-1882.) Description de l'observatoire météorologique et magnétique à Utrecht. 56 pp. 2 plates. 8vo. *Utrecht, 1849*
Description of instruments including one for recording the variations of magnetic declination.

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- 1161. Moigno, F**(rançois Napoléon Marie.) (1804-1884.) *Traité de télégraphie électrique, reinférant son histoire, sa théorie et la description des appareils, avec les deux mémoires de M. Wheatstone sur la vitesse et la détermination des courants d'électricité, et un mémoire inedit d'Ampère sur la théorie électro-chimique.* xxiv+420 pp. 16 plates. 8vo. *Paris, 1849*
One of the early manuals of telegraphy containing theory, practise, and history. Abbé Moigno was eminent as mathematician and physicist. (See No. 2910.)
- 1161a.** — *Traité de télégraphie électrique, comprenant son histoire, sa théorie, ses appareils, sa pratique, son avenir, sa législation; précédé d'un exposé de la télégraphie en général et de la télégraphie ancienne du jour et de nuit.* 2 ième edition, entièrement refondue et complétée. 2 vols.—Text and atlas—22 plates. 8vo. *Paris, 1852*
Two errors may be noted: 1) the date of Coxe's apparatus is 1816 not 1810: 2) the needles in Baron Schilling's telegraph were horizontal not vertical. —See also 3310.
- 1162. Murray, (Sir) James.** (1788-1871.) *Electricity, as a cause of cholera, or other epidemics, and the relation of galvanism to the action remedies.* 160 pp. 12mo. *Dublin, 1849*
Chapter on the earth as a magnet.
- 1163. Petrina, Franz (Adam.)** (1799-1855.) *Einfluss der Entfernung des Polardrahtes von der Magnetnadel auf das Maximum ihrer Ablenkung.* (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl. Jahrg. 1849, pp. 165-168) 8vo. *Vienna, 1849*
Deflection and oscillations of a magnet by a current in a neighboring conductor. (Autograph copy, dedicated to Prof. Joh. Mueller). —See also 1066.
- 1164. Pluecker, J(ulius.)** (1801-1868.) *Enumeratio novorum phenomenonum de magnetismo inventorum.* 28 pp. 1 plate. 4to. (Program.) *Bonn, 1849*
Diamagnetic phenomena and magne-crystallic behavior of certain crystalline substances. —See also 1295, 2888.
- 1165. Smee, Alfred.** (1818-1877.) *Elements of electro-biology; or the voltaic mechanism of man; of electro-pathology and especially of the nervous system and of electro-therapeutics.* xii+164 pp. 2 tables. 8vo. *London, 1849*
- 1165a.** — *Principles of the human mind deduced from physical laws, being a sequel to elements of electro-biology; together with the lecture on the voltaic mechanism of man, delivered at the London Institution, April 11, 1849.* xvi+16 pp. ill. 8vo. *London, 1849*
—See also 1006.
- 1166. Steinheil, K(arl) A(ugust.)** (1801-1870.) *Beschreibung und Vergleichung der galvanischen Telegraphen Deutschlands*

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nach Besichtigung im April, 1849. (Abh. Bayer. Akad. Wiss. Math.-Nat. Kl. Vol. 3, Abt. III., pp. 779-840) 8vo.

Munich, 1849

German telegraph lines with suggestions for improvements.

—See also 947.

1167. **Adriani, A.** Verhandelng over gutta percha en caoutchouc en derzelver verhouding tot onderscheidene agentia. 75 pp. 8vo. *Utrecht, 1850*

Tests to distinguish gutta percha from caoutchouc.

1168. **Burnett, C(harles) M(ountford.)** (1807-1866.) Philosophy of spirits in relation to matter. xx+312 pp. 8vo. *London, 1850*
Work of pure imagination.

1169. **Clark, Edwin.** (1814-1894.) The Britannia and Conway tubular bridges with general inquiries on beams and on the properties of materials used in construction, published with the sanction and under the immediate supervision of Robert Stephenson. 2 vols. Atlas in folio. ill. 18 plates. 8vo. *London, 1850*

Mr. Edwin Clark was the resident engineer in charge of the construction and for a time had his younger brother Josiah Latimer Clark with him as assistant engineer. (See Nos. 2897, 4119.)

—See also 2069, 2972.

1170. **Comstock, John Lee** (1789-1858) & **R. D. Holbyn.** First book of heat, light, and optics, and electricity. 128 pp. 16mo. (Scott's first books in science.) *London, (1850?)*

Three chapters condensed from the author's *Manual of Natural Philosophy*.

—See also 1485.

1171. **Cornelius, Karl Sebastian.** (1820-1896.) De fluido electrico in rerum natura statuendo. 15 pp. 8vo. *Halle, 1850*

Views of Franklin, Symmer and Faraday discussed.

1172. **Du Bois-Reymond, E(mil) Heinrich.** (1818-1896.) Sur les mémoires relatifs aux phénomènes électrophysiologiques. (Extract, Comptes rendus, Acad. Sc. Vol. 31, 1850) 20 pp. 4to. *Paris, 1850*

Résumé of work done in electro-physiology with special reference to that of the author.

—See also 1202, 1222, 1254, 1280, 1516, 1541, 1769, 1903.

1173. **Felici, R(iccardo.)** Sulle polarita galvaniche secondarie e sull'influenza del calore della corrente elettrica nei liquidi. (Ann. Univ., Toscana Sc. Cosm. Vol. 2, pp. 173-186) 4to. *Pisa, 1850*

The e. m. f. of polarization and effect of heat on the conductivity of liquids.

—See also 1283, 1797.

1174. **Francis G(eorge) William.** (1800-1865.) Electrical experiments; illustrating the theory, practice, and application of the science of free or frictional electricity. Fifth edition. 91 pp. ill. 8vo. *London, 1850*

Numerous entertaining experiments in frictional electricity; illustrations of historical machines. The author was a popular lecturer on natural philosophy.

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1175. **Froriep**, Robert. (1804-1861.) On the therapeutic application of electro-magnetism in the treatment of rheumatic and paralytic affections; translated from the German by R. M. Lawrence. 205 pp. 8vo. *London, 1850*
1176. **Galton**, Francis. The telotype; a printing electric telegraph. 32 pp. 4 plates. 8vo. *London, 1850*
Messages printed in the ordinary alphabetical characters; manuscript letter of the author.
1177. **Ghisi**, Lorenzo Agostino. *Telegrafia elettrica, ossia descrizione dei telegrafi elettro-magnetici, loro modo di agire e loro applicazione agli usi sociali.* Second edition, enlarged and corrected. 76 pp. 2 plates. 8vo. *Milan, 1850*
Paper of general information on telegraphy.
1178. **Grieb**, Chr(istoph.) Fr(iedrich.) *Die Wunder der elektrischen Telegraphie; eine gemeinverstaendliche Geschichte und Beschreibung derselben, nebst Andeutungen ueber ihre zukuenftige Wirkung.* 208 pp. 2 plates. 16mo. *Stuttgart, 1850*
Some of the wonders of the electric telegraph briefly described.
1179. **Gundolf**. *Ueber elektromagnetische Telegraphie.* 24 pp. 4to. (Jahresbericht, Gymnasium Theodorianum.) *Paderborn, 1850*
The electro-magnetic dial telegraph.
1180. **Harris**, (Sir) William Snow. (1792-1867.) *Rudimentary magnetism: being a concise exposition of the general principles of magnetical science.* 3 parts. ill. 12mo. *London, 1850-1852*
The author's compass is described p. 149.
- 1180a. —Second edition revised and enlarged by Henry M. Noad. viii+412 pp. ill. 12mo. (Weale's Rudimentary Series, No. 8.) *London, 1872*
—See also 801.
1181. **Mackrell**, G., J. W. **Gann** and Thomas **Pollock**. On the action upon the galvanometer by arrangements of coloured liquids in a U tube. 50 pp. 8vo. *London, 1850*
Observations on electric induction and the electric state of the atmosphere.
—See also 870.
1182. **Marié-Davy**, (Edme Hippolyte). (1820-1893.) *Mémoire (I., II., & III.) sur l'électricité.* (Mém. Acad. Sc., Montpellier, 1847-1850, pp. 13-159) 4to. *Montpellier, 1850*
Three short memoirs on the voltaic battery and Ohm's law.
—See also 1525, 3302.
1183. **Maus**, (Jean Marie) Henrie and Pierre **Paleocapa**. (1789-1867.) *Rapport sur les études du chemin de fer de Chambéry à Turin et de la machine proposée pour exécuter le tunnel des Alpes entre Modane et Bardonnèche et Rapport rédigé, au nom de la commission chargée de l'examen de ces études, par M. le chevalier Pierre Paleocapa, suivi des Procès-verbaux des*

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séances de cette commission. 56 pp. 9 plates and maps.
Folio. *Turin, 1850*

This engineering report is followed by maps of the country and places of the proposed railway route from Chambéry to Turin.

1184. **Oersted, Hans Christian.** (1770-1851.) *Gesammelte Schriften, deutsch von K. L. Kannegiesser.* 6 vols. pls. portr. 8vo.

Leipzig, (1850-1851)

Views concerning matter and spirit; sound, astronomy, sympathy, preceded by a biographical notice.

- 1185.—**Der Geist in der Natur.** Deutsch von K. L. Kannegiesser nebst einer biographischen Skizze von P. L. Moeller. xxxii+200 pp. 8vo. *Leipzig, 1850*

Biographical notice of Oersted followed by some of his views on nature and superstitions.

- 1185†a.—(English translation.) *Soul in nature with supplementary contributions.* Translated from the original German edition by L(eonora) and J(oanna) B. Horner. xlv+465 pp. portr. 12mo. (Bohn's Scientific library.) *London, 1852*

- 1186.—**Die Naturwissenschaft in ihrem Verhaeltniss zur Dichtkunst und Religion.** xvi+71 pp. 8vo. *Leipzig, 1850*

Some of the author's views on religion.

—See also 773.

1187. **Quetelet, (Lambert) A(dolphe Jacques).** (1796-1874.) *Résumé des observations sur la météorologie et sur le magnétisme terrestre.* (Observatoire R. de Bruxelles) 76 pp. 4to.

Brussels, 1850

General meteorological data for Belgium, (Autograph copy).

—See also 968.

1188. **Reichenbach, Karl (Ludwig Friedrich von).** (1788-1869.) *Researches on magnetism, electricity, heat, crystallization, and chemical attraction, in their relation to the vital force.* Translated and edited by the express desire of the author with a preface, notes and appendix by William Gregory. Parts I & II. (No more published) xlv+463 pp. ill. 3 plates. 8vo.

London, 1850

Instances of persons who seemed to the author to be affected by a strong magnetic field.

—See also 1104.

1189. **Secchi, A(ngelo).** (1818-1878.) *Sullo stato attuale delle telegrafia. Relazione.* (Ann. Sc. Math. Fis. Vol. I, pp. 23-41.) 8vo.

Rome, 1850

The three telegraph systems used in America; the author was the distinguished Jesuit astronomer.

—See also 1240, 3147.

1190. **Sturgeon, William.** (1783-1850.) *Scientific researches, experimental and theoretical, in electricity, magnetism, galvanism,*



1184. ØRSTED. (See No. 4377.)

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electro-magnetism and electro-chemistry. viii+563 pp. 19 plates. 4to. *London, (1850)*

This quarto volume contains the author's description of his discoveries of the soft-iron electro-magnet (bar and horse-shoe,) his electro-magnetic engine, commutator amalgamated zinc plates, study of atmospheric electricity by means of kites, fracture of Leyden jars, etc., the whole preceded by a history of electro-magnetism carried down to 1823 and followed by 19 plates of illustrations.

—See also 925.

1191. Szapary, (Franz.) *Magnetismus von 1850*. I. Grundton (zur Harmonie der Wissenschaften). II. Aries. 152+120 pp. 1. 8vo. *Gratz, 1850*

A miscellany with an article on "magnetic colloquizing."

1192. Walker, A(dam.) (1731-1821.) *Analysis of a course of lectures on natural and experimental philosophy*. Fourth edition. 90 pp. 8vo. *(London, 1850)*

Short lecture on electricity: "Many experiments tend to prove the electrical fluid to be elementary phlogiston", p. 60.

—See also 618.

1193. Wilmot, Arthur Parry Eardley. *Complete and universal dictionary of signals for the boats of Her Majesty's fleet, well adapted for yachts, the merchants service, etc.; containing a variety of new and simple modes of signaling*. 24 l.+xxiv+181 pp. ill. 24 plates. 16mo. *London, 1850*

Flags, balls, and semaphores used in the British navy.

- 1193a. —Second edition, 24 l.+xxiv+28 pp. ill. 24 plates. 18mo.

London, 1851

1194. Alexander, William. *Plan and description of the original electro-magnetic telegraph, with prefatory note to the Royal Commissioners*, 30 pp. 1 plate. 8vo.

London, & Edinburgh, 1851

Letters written in 1837 by Lord John Russell relating to the author's proposal to establish telegraphic communication between Edinburgh and London by underground conductors; description of apparatus.

1195. Amberger, (François Joseph Jérôme) Nicklès (1820-1869) and Cassal. *Application de l'électro-magnétisme dans la locomotion sur chemins de fer et dans les transmissions de mouvement*. (Extract, *Revue Scient. et industr.* Ser. iii., Vol. 9.) 8 pp. 8vo. *Paris, 1851*

Note on the application of electro-magnets to traction.

—See also 1265.

1196. Billet, (Felix.) (1808-1882.) *Des condensations électriques de deuxième et de troisième espèce*. (Mém. Acad. Sc., Dijon, 1851, pp. 66-72.) 8vo. *Dijon, 1851*

Experiments with plate condensers.

—See also 2928.

1197. Brewster, (Sir) David. (1781-1868.) *Popular treatise on magnetism from the Seventh edition of the Encyclopaedia Britannica*. 363 pp. ill. map. 8vo. *Edinburgh, 1851*

Written for the seventh edition of the *Encyclopaedia Britannica*. The chap-

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ters on terrestrial magnetism and magnetic instruments are of special interest. The volume contains Prof. Barlow's magnetic chart of lines of equal declination with position of magnetic pole as deduced from observations of Commander Ross. Zantedeschi's observations on the action of light on a magnet, p. 49.
—See also 1315, 2995.

1198. **Bruck**, (Nicolas) R(ené.) *Electricité ou magnétisme du globe terrestre.* 3 vols. 4 charts. 8vo. *Brussels, 1851-1852*
Analysis and discussion of observations of terrestrial magnetism.
1199. **Buff**, Heinrich. (1805-1878.) *Familiar letters on the physics of the earth treating of the chief movements of the land, the waters, and the air, and the forces that give rise to them; edited by A. W. Hofmann.* xiii+273 pp. 12mo. *London, 1851*
The last letter treats of atmospheric electricity and lightning.
—See also 1009.
1200. **Chalmers**, Charles. *Thoughts on electricity with notes of experiments.* Third edition. 57 pp. ill. 2 plates. 8vo. *Edinburgh, 1851*
These thoughts refer chiefly to the electric decomposition of water, and potash.
—See also 1350, 1413.
1201. **Dods**, John Bovee. *Philosophy of electrical psychology.* 252 pp. 12mo. *New York, 1851*
Contains a wide range of subjects; "electric psychology" is considered to be the most sublime system of philosophy.
1202. **Du Bois-Reymond**, (Emil Heinrich). (1818-1896.) *Untersuchungen ueber thierische Elektricitaet.* (Moleschott, *Untersuchungen*, Vol. II., pp. 137-157+247-284.) 8vo. *Frankfort, 1851*
Extensive research on animal electricity.
—See also 1172.
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Experimental study of the action of induced currents of different orders on each other and on the primary.

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—See also 961.
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Important contribution to our knowledge of thermo-electricity.
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Practical book based on personal experience.
- 1212†bis. **Reid, D(avid) B(oswell)** (1805-1863) and **Alexander Bain** (1818-1877). *Elements of Chemistry and Electricity.* In two parts. Edited by D. M. Reese. 410 pp., plates. 12mo. (*Chamber's Educational Course*, No. 4.) *New York, 1851*
American re-edited edition. The portion treating of electricity (by Bain, who on the title page is described as "the inventor of the electric clock") occupies pp. 225-364, with separate illustrations on pp. 403-410. The volume is designed to introduce the teaching of science as an elementary branch of education "in all schools and academies."
—See also 995.
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—See also 1299.

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This memoir contains a chapter on the telegraphic circuit and another on some electric apparatus devised by the author.
—See also 1502, 1655, 1700, 1924, 1956, 2005, 2196, 2260, 3259.
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The author concedes to Franklin the discovery of the effects of points, but claims for M. de Romas the prior use of the kite for the electrical exploration of the atmosphere; impugns the authority of Priestley.
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- 1289.** **Melloni, Macedonio.** (1798-1854.) Sulla eguaglianza di velocità che le correnti elettriche di varia tensione assumono nello stesso conduttore metallico. (*Ann. Sc. Mat.-Fis. Ser. I.*, Vol. 5, pp. 319-325.) 4to. *Rome, 1854*
The velocity of current transmission in a given conductor is independent of the impressed e. m. f.
- 1290.**—Sulla induzione elettrostatica. (*Ann. Sc. Mat.-Fis. Ser. I.*, Vol. 5, pp. 327-334.) 1 plate. 4to. *Rome, 1854*
Research on electrostatic induction. (See Nos. 1949, 1993, 2012, 2054.)

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- 1291.—Elettroscopie. (Ann. Sc. Mat.-Fis. Ser. I., Vol. 5, pp. 335-343.) 1 plate. 4to. *Rome, 1854*
Description of the author's electroscope with diagrams.
- 1292.—Sopra alcuni fenomeni di elettricismo statico e dinamico recentemente osservati da Faraday nei conduttori de telegrafi sotterranei e sottomarini. (Rend. R. Accad. Sc., Napoli, Ser. II, Vol. 3, pp. 30-38.) 8vo. *Naples, 1854*
Note on Faraday's demonstration of the "electrification" of submarine cables.
1293. Meyer, Moritz. (1821-1893.) Die Elektricität in ihrer Anwendung auf praktische Medicin. xiii+167 pp. ill. 8vo. *Berlin, 1854*
Work on electro-therapeutics.
1294. Pekarek, Franz. Ueber elektrische Lampen. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., Vol. 12, pp. 263-274.) 2 plates. 8vo. *Vienna, 1854*
Arc lamps and regulating mechanisms.
1295. Pluecker, Julius. (1801-1868.) Commentatio de crystallorum et gazorum conditione magnetica. 34 pp. 4to. (Inaugural dissertation.) *Bonn, 1854*
Dissertation on the diamagnetic properties of certain crystals and gases.
—See also 1164.
1296. Quetelet, (Lambert) Ad(olphe Jacques). (1796-1874.) Sur l'électricité des nuages orageux. (Bull. Acad. Sc., Bruxelles, Vol. 21, pp. 6-15.) 8vo. *Brussels, 1854*
Note on the charge and inductive effects of thunder-clouds.
—See also 968.
1297. Robinson, T(homas) R(omney). (1792-1882.) On the luminous phenomena produced by the discharge of Ruhmkorff's induction apparatus. (Proc. Irish Acad., Vol. 6, pp. 282-290.) 8vo. *Dublin, 1854*
Study of the discharge from an induction coil through gases and vapors at varying pressures.
—See also 1148.
1298. Robiquet, H(enri) E(dme). (1822-1860.) Observations au sujet de la théorie de Franklin sur la nature du fluide électrique. pp. 32-46. 4to. (Thèse.) *Paris, 1854*
The objections of Aepinus to Franklin's theory answered; theory of the electrostatic machine, the electrophorus and condenser explained according to the one and also the two-fluid theory.
1299. Rutter, J. O. N. Human electricity; the means of its development. Illustrated by experiments. With additional notes. vi+182+lxii pp. ill. 1 plate. 12mo. *London, 1854*
A popular work. Among subjects treated are; the electricity of the human body, health and disease as affected by electricity.
—See also 1213.
1300. Schellen, (Thomas Joseph) H(einrich). (1818-1884.) Der elektromagnetische Telegraph in den Hauptstadien seiner Ent-

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- wicklung und in seiner gegenwaertigen Ausbildung und Anwendung, nebst einer kurzen Einleitung ueber die optische und akustische Telegraphie und einem Anhang ueber den gegenwaertigen Betrieb der elektrischen Uhren. xii+259 pp. 1 plate. 8vo. *Brunswick, 1854*
 Mechanical, optical and electrical telegraphs; lightning arresters, electric clocks.
- 1300a.—Fifth edition. (Bedeutend erweiterte und den neuesten Zustanden des Telegraphenwesens angepasste Auflage.) x+801+xxiii pp. 600 ill. 8vo. *Brunswick, 1870*
 —See also 1069.
1301. Schoenbein, C(hristian) F(riedrich). (1799–1868.) Ueber die chemischen Wirkungen der Elektricitaet der Waerme. (Verh. Naturf. Ges. Basel, Vol. 1, pp. 18–67.) 8vo. *Basle, 1854*
 Some chemical effects of the electric current. (Autograph copy, dedicated to Faraday.)
 —See also 989.
1302. Tate, T(homas) Turner). (1807–1888.) Electricity for the use of beginners. iv+100 pp. ill. 16mo. *London, 1854*
 —See also 3262.
1303. Turnbull, Laurence (1821–1900) and W(illiam) C. McRea. Railroad accidents, and the means by which they may be prevented by the use of the electromagnetic safety apparatus. 63 pp. 12mo. *Philadelphia, 1854*
 —See also 1271.
1304. Willigen, V(olkert) S(imon) M(aarten) van der. (1822–1878.) Proeven betreffende den galvanischen lichtboog. 13 pp. 8vo. *Deventer, 1854*
 Heat and light produced by voltaic batteries.
 —See also 1343, 1374, 1431, 1470, 1504, 2114.
1305. Vinchent, J. (1822–1887.) Notice sur l'établissement des lignes télégraphiques en Belgique. 75 pp. 8vo. *Brussels, 1854*
 —See also 3268.
1306. Wallace, W(illiam) Clay. An attempt to show that light, heat, electricity, and magnetism are effects of the law of gravitation. 15 pp. ill. 8vo. *New York, 1854*
 The earth and the sun constitute a geoheliac battery; the earth and the moon a geoselenic battery.
 —See also 5249.
1307. Window, Frederick Richard. On the electric telegraph and the principal improvements in its construction. With an abstract by Charles Manby. (Excerpt Minutes Proc. Instit. Civil Engin., Vol. 2.) 62 pp. 8vo. *London, 1854*
 General account of electric telegraphy: the double needle instrument; Brett's printing, Blakewell's copying and Siemens' printing telegraphs.
 —See also 1402, 1474, 3073.
1308. Orr's circle of the sciences, a series of treatises on the principles of Science. 9 vols. ill. map. 8vo. *London, 1854–1856*
 Treatises on geometry, trigonometry, astronomy, electricity and magnetism.

Paris, you can draw a profile by ordinary means there, and the same profile draws itself at the same time at Frankfort. Attempts of this sort have succeeded. The apparatus has been exhibited at the London Exhibition. Some details, however, remain to be perfected. It would seem impossible to go beyond this in the region of the marvellous. Let us try, nevertheless, to go a few steps further. I have asked myself, for example, if the spoken word itself could not be transmitted by electricity; in a word, if what was spoken in Vienna may not be heard in Paris? The thing is practicable in this way:—

We know that sounds are made by vibrations, and are made sensible to the ear by the same vibrations, which are reproduced by the intervening medium. But the intensity of the vibrations diminishes very rapidly with the distance; so that even with the aid of speaking tubes and trumpets, it is impossible to exceed somewhat narrow limits. Suppose that a man speaks near a movable disk, sufficiently flexible to lose none of the vibrations of the voice; that this disk alternately makes and breaks the connection with a battery; you may have at a distance another disk which will simultaneously execute the same vibrations.

It need not be said that numerous applications of the highest importance will immediately arise from the transmission of speech by electricity. Any one who is not deaf and dumb may use this mode of transmission, which would require no apparatus except an electric battery, two vibrating disks and a wire. In many cases, as, for example, in large establishments, orders might be transmitted in this way, although transmission in this way will not be used while it is necessary to transmit letter by letter, and to make use of telegraphs which require use and apprenticeship. However this may be, it is certain that in a more or less distant future, speech will be transmitted by electricity. I have made some experiments in this direction. They are delicate, and demand time and patience; but the approximations obtained promise a favorable result.

CHARLES BOURSEUL.

PARIS, August 18, 1854.

1308bis. BOURSEUL. (*Translation of a portion of a communication printed in "L'Illustration," Paris, August 26, 1854.*)

- 1308[†]bis. **Telephone—Bourseul.** Five publications relating to Charles Bourseul. The papers, written originally in foreign languages, are translated into English. 1854-1878
 1. *L'Illustration*, Journal Universel, Aug. 26, 1854. A communication from Charles Bourseul. 2. *Didaskalia*, *Blaetter fuer Geist, Gemueth und Publicitaet*. No. 232. Apparently an abstract of the foregoing Bourseul article. 3. *Exposé des Applications de l'Électricité*, by Du Moncel, Vol. II, p. 225, ed. 1854; Vol. III, p. 110, ed. 1856. Reprint of the body of Bourseul's communication to *L'Illustration*. 4. *Comptes Rendus des Séances de l'Académie des Sciences*, Nov. 26, 1877. Extract from paper about Bourseul and Bell, read before the Académie by Du Moncel. 5. *The Telephone, the Microphone and the Phonograph*, by Du Moncel, published in French 1878, and in English by Harper Bros., 1879, pp. 12-15.
1309. **Arago**, (Dominique François Jean). (1786-1853.) *Meteorological essays with an introduction by Alexander von Humboldt*, translated under the superintendence of Colonel Sabine. xxxvi+504 pp. 8vo. London, 1855
 Storehouse of facts and general information on electric and magnetic phenomena.
 —See also 915.
1310. **Becquerel**, (Antoine César) (1788-1878) & Alexandre E(dmond) **Becquerel**. (1820-1891.) *Traité d'électricité et de magnétisme. Leurs applications aux sciences physiques, aux arts et à l'industrie*. 3 vols. ill. 8vo. Paris, 1855-1856
 The first volume treats of general principles; the second of electro-chemistry; the third of magnetism and electro-magnetism. This last volume contains numerous magnetic charts.
 —See also 882, 1439.
1311. **Bertelli**, Timoteo. (1826-1905) & Alessandro **Palagi**. *Sulla distribuzione delle correnti elettriche nei conduttori. Esperienze*. 25 pp. 3 plates. 8vo. Bologna, 1855
 Experiments on the mode of propagation of an electric current in telegraph wires.
 —See also 1267, 1441.
1312. **Bois**, (François) Victor. (1813-1870.) *La télégraphie électrique*. 127 pp. 12mo. Paris, 1855
 Chappe's mechanical telegraph, the electric dial-telegraph, the Morse code and other electrical generalities.
1313. **Boudin**, (Jean Christian Marc François Joseph). (1806-1867.) *De la foudre considérée au point de vue de l'histoire de la médecine légale et de l'hygiène publique*. 50 pp. 8vo. Paris, 1855
 Brief historical notice with numerous references: effect of lightning-stroke on the animal system.
- 1314.—*Histoire de la foudre et des paratonnerres*. 56 pp. ill. 8vo. Paris, 1855
 The lightning-rod considered historically and practically.
 —See also 1277.
1315. **Brewster**, (Sir) David. (1781-1868.) *The electric telegraph*. (North British Rev., Vol. 22, pp. 545-591.) 8vo. Edinburgh, 1855
 Consecutive account of the development of the electric telegraph: letter of

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C. M. (Charles Marshall) from the Scots Magazine, 1753. (See No. 378.)
—See also 1197.

1316. **Bright**, Edward Brailsford. *Vis*, a treatise on the predominating influence of the sunbeam throughout creation. viii+161 pp. 12mo. *London, 1855*
Solar variation and not the force of gravitation governs all cosmical phenomena. Periodic changes in magnetic declination.
—See also 1666, 2447, 3925.
1317. **Channing**, William F. The American fire-alarm telegraph: a lecture delivered before the Smithsonian Institution, March, 1855. (Reprinted from Ann. Report Smithsonian Institution, 1854, pp. 147-155.) 19 pp. 8vo. *Boston, 1855*
The system described is that of Moses G. Farmer.
—See also 2958.
1318. **Figuiér**, (Guillaume Louis). (1819-1894.) Exposition et histoire des principales découvertes scientifiques modernes. 4 ième edition. 4 vols. ill. 12mo. *Paris, 1855-1857*
Vol. II contains a history of electric telegraphy; Vol. IV the lightning-rod and the voltaic battery.
—See also 1354, 1719.
1319. **Galle**, L(udwig). Katechismus der elektrischen Telegraphie. xii+191 pp. ill. 12mo. (Weber's Katechismen, Vol. 21.) *Leipzig, 1855*
The essentials of electric telegraphy.
- 1319a.——3d edition (vermehrte und verbesserte Auflage). xii+232 pp. ill. 12mo. *Leipzig, 1864*
1320. **Goodyear**, Charles. (1800-1860.) Gum-elastic and its varieties, with a detailed account of its applications and uses, and of the discovery of vulcanization. 2 vols. 8vo. *New Haven, 1855*
The manufacture of India rubber and its various uses.
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Celebrated memoir on the magnetic dip in the north-temperate zone.
—See also 756.
1322. **Horn**, Hermann. Darstellung der magnetischen Polaritaets-Verhaeltnisse gegenueberstehender lebender Organismen mittels der Magnetnadel. 35 pp. 8vo. *Munich, 1855*
Magnetism of the human organism, plants, etc.
1323. **Lardner**, Dionysius. (1793-1859.) Electric telegraph popularized. From "The Museum of Science and Art." vi l.+pp. 113-208+1-149 (250 pp.) ill. 1 plate. 12mo. *London, 1855*
Cable laying in the early days, par. 145; Maury's telegraphic plateau, par. 169.
- 1324.——Handbook of natural philosophy. 4 vols. ill. 12mo. *London, 1855-1856*
Manual of physical science involving a knowledge of elementary mathematics only. Vol. IV, Electricity, magnetism, and acoustics.

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- 1324a.—Handbook of electricity, magnetism and acoustics. Seventh thousand. Edited by G. C. Foster. xix+442 pp. ill. pl. 12mo.
London, 1866
Numerous and valuable additions to the original by Prof. G. Carey Foster.
—See also 876.
1325. **Lyon, Lucius.** Treatise on lightning conductors, compiled from a work on thunderstorms by S. W. Harris and other standard authors. Second edition. xvi+240 pp. 12mo. *New York, 1855*
Compilation principally from the works of Sir William Snow Harris and Noad.
1326. **Michaud, L.** La terre, l'eau, l'air et le feu; ou Notions de physique, de mécanique, de chimie et de géologie en rapport avec les phénomènes naturels du globe et les usages ordinaires de la vie. Seconde partie: La terre et le feu. 324 pp. 10 plates. 12mo. *Lausanne, 1855*
Eighty pages of popular treatment of magnetism and electricity.
1327. **Miège, B. & T. R. Ungérer.** Vade-mecum pratique de télégraphie électrique à l'usage des employés du télégraphe. Première partie. Cours élémentaire professé à l'administration centrale des lignes télégraphiques, par B. Miège. Deuxième partie: Études pratiques sur le système et appareil Morse, par T. R. Ungérer. 2 parts. ill. 2 plates. 12mo. *Paris, 1855*
Telegraphic essentials.
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Two hundred pages are devoted to magnetism and electricity.
- 1328a.—Part I. Fifth edition, revised with additions by Herbert McLeod. ill. 8vo. *London, 1872*
—See also 2244, 3356.
1329. **Mullaly, John.** Trip to Newfoundland; its scenery and fisheries; with an account of the laying of the submarine telegraph cable. 108 pp. ill. 12mo. *New York, 1855*
Narrative of the laying of the cable between Port au Basque and North Sydney, 1855; the writer was a member of the expedition. He was also on board the U. S. steam-frigate *Niagara* as secretary to Prof. Morse and afterwards to Cyrus W. Field, while the cables of 1857 and 1858 were being laid.
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1330. **Ogan, Alfred.** Railway collisions prevented. xx+34 pp. 5 plates. 8vo. *London, 1855*
Electro-magnetic apparatus for operating railway signals.
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Account of experiments made by the author on a circuit consisting of copper wire and a considerable length of a railroad line.

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- 1331a.—(Facoltà elettro-motrice del carbone.) (Extract, Rend. Accad. Sc. Bologna, 1855-1856. pp. 62-65.) 4 pp. 8vo.
Bologna, (1856?)
 Deposition of copper from solution of copper-sulphate on incandescent charcoal.
 —See also 1267.
1332. Philips, A. J. P. (pseud.) (*i. e.*, J. P. Durand). Electro-dynamisme vital; ou, les relations physiologiques de l'esprit et de la matière démontrées par des expériences entièrement nouvelles et par l'histoire raisonnée du système nerveux. xlvii+383 pp. 8vo. *Paris, 1855*
 Investigation on the manner in which nerves and muscles are affected by the electric current.
1333. Poggendorff, (Johann Christian). (1796-1877.) Fortgesetzte Beobachtungen ueber Inductions-Elektricität. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl. 1855, pp. 12-42.) 8vo. *Berlin, 1855*
 Construction and function of the various parts of an induction coil.
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1334. Regnard, Edouard. Mémoire sur la télégraphie électrique à courants combinés et à double échappement et sur l'horlogerie électrique. 46 pp. 2 plates. 8vo. *Paris, 1855*
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 Study of the various causes that may affect the e. m. f. of a cell; a new method of determining the e. m. f. of a battery.
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1336. Robinson, T(homas) R(omney). (1792-1882.) Experimental researches on the lifting power of the electro-magnet. (Trans. Roy. Irish Acad., Vol. 22, pp. 291-311+499-524; Vol. 23, pp. 501-533.) 4to. *Dublin, 1855-1859*
 Experimental inquiry into the relation between the position of the turns of wire, the length of the magnetic circuit, and the lifting power of an electro-magnet.
- 1337.—On the relation between the temperature of metallic conductors, and their resistance to electric currents. (Trans. Roy. Irish Acad., Vol. 22, pp. 1-24.) 4to. *Dublin, 1855*
 One of the principal facts established is that the resistance of a conductor to the passage of a current increases without limit up to the point of fusion.
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 Among the instruments described are a magnetograph and photo-electrograph.
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 Written for beginners.
1342. **Tresca, Henri Edouard.** (1814–1885.) Visite à l'exposition universelle de Paris, en 1855. Publié avec la collaboration de MM. Alcan, Bandement, Boquillon, Delbrouckainé, Dekerain, Fortin, Hermann, J. Gaudry, Molinos, C. Nepreu, H. Peligot, Pronnier, Silbermann, E. Trelat, U. F. Trelat, Tresca, sous la direction de M. Tresca. 785 pp. pl. 16mo. *Paris, 1855*
 Notices of the electric light, as seen in the Paris Exposition of 1855; also of gutta serena and electro-metallurgy.
 —See also 3566.
1343. **Willigen, V(olkert) S(imon) M(aarten) van der.** (1822–1878.) Over combinatie-toonen, zoogenaande stooten en conen dissonantie. (Versl. Akad. Wetensch. Amsterdam, Vol. 3, pp. 115–146.) 8vo. *Amsterdam, 1855*
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 General, practical work on the electric telegraph.
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 Retardation of signals in long subterranean or submarine conductors.
1346. **(Atkinson, James.)** The universal powers of nature revealed, and the law delineated; in a graphic outline of the history of the earth by a philosopher. 252 pp. 8vo. *London, 1856*
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 The transformation of heat-energy into electricity.
 —See also 3048.

7 July 1857

My dear Sir

I am on the point of leaving
town but hasten to acknowledge
your letter. As I said before when
you can do any of these things I
shall be willing to ~~look~~ a little
dearer at them. But how is it
that the believers in these things
make such a shouting out for the
scientific man? Why do they not
become scientific themselves and prove
there are so-called facts as scientific
men prove their facts. If they are

to much wiser than countless men
as to form a new judgment when
the latter are wrong why do they want
to fall back upon them? To me
this desire to imitate the mass of
men is a proof that they do
positively doubt what they wish to
believe if they be the possessors
of knowledge why should they wait
for that which to them is only a
slow dusty cart joggling along the
common road?

Ever Truly Yours

Laburn Clarke Esq
21 W. 21st St
New York

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1348. **Bosscha, J(ohannes)** (The younger). Broeve eener oplossing van een vraagstuk, betreffende de elektrische telegrafie. (Versl. Akad. Wetensch. Amsterdam, Vol. 4, pp. 101-118.) 1 plate. 8vo. *Amsterdam, 1856*
Development of the electric telegraph.
—See also 1276.
1349. **Bourgeat, J. B.** Études sur Vincent de Beauvais, théologien, philosophe, encyclopédiste, ou, Spécimen des études théologiques, philosophiques et scientifiques au moyen âge XIII. siècle. 1210-1270. viii+231 pp. 8vo. (Thèse.) *Paris, 1856*
Critical study of the work of Vincent of Beauvais, the Dominican encyclopedist of the thirteenth century, from a philosophical and theological standpoint. (See no. 1.)
1350. **Chalmers, Charles.** Notes for inquiry. Notes on the solar system and notes on electricity. Two tracts. 8+8 pp. ill. 8vo. *Edinburgh, 1856*
—See also 1200.
1351. **Du Moncel, Th(éodore) Achille Louis.** (1821-1884.) Exposé des applications de l'électricité. Seconde édition. Vols. 1-3, 5. ill. pls. 8vo. *Paris, 1856-1862*
After a lengthy description of electro-magnetic apparatus, the author treats of the mechanical, physical and physiological applications that have been made of the electric current. The last volume is devoted to the progress in the applications of electricity made from 1859 to 1862.
- 1351a.—Third edition. (Entièrement refondue.) 5 vols. 22 plates. 8vo. *Paris, 1872-1878*
An excellent work for reference in looking up the prior state of the electrical art.
—See also 1223.
1352. **Ebner, (Moritz) von.** Ueber die Anwendung der Reibungs-Elektricität zum Zünden von Sprengladungen. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., Vol. 21, pp. 85-111.) 1 plate. 4to. *Vienna, 1856*
Application of frictional electricity to blasting.
—See also 1612.
1353. **Faraday, Michael.** (1791-1867.) Letter to Latimer Clark on the death of Melloni, 1856; another, 1857, on spiritualistic séances. MSS. *1856-1857*
—See also 787.
1354. **Figuier, Guillaume Louis.** (1819-1894.) Les applications nouvelles de la science à l'industrie et aux arts en 1855. iv+388 pp. 12mo. *Paris, 1856*
Chapters on electric lighting, electrotyping, photography, etc.
—See also 1318.
1355. **Force, Peter.** Record of auroral phenomena observed in the higher northern latitudes. 118 pp. 4to. *Washington, 1856*
List of auroral observations prior to 1851 with place, date and remarks.

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1356. **Ganot**, A(dolphe). (1804-1887.) *Traité élémentaire de physique expérimentale appliquée et de météorologie, avec un recueil nombreux de problèmes, illustré de 532 belles gravures sur bois intercalées dans le texte. Sixième édition; un seconde appendice de problèmes, de 21 gravures nouvelles et des travaux les plus récents sur l'électricité.* 806 pp. ill. diagr. 12mo.
Paris, 1856
Standard text-book of elementary physics and meteorology.
—See also 1454.
1357. **Gore**, George. *Theory and practice of electro-deposition, including every known mode of depositing metals, etc.* viii+104 pp. ill. 8vo. (Orr's Circle of the Sciences, Vol. VIII.)
London, 1856
—See also 2030, 2283, 2356, 2408, 3022.
1358. **Harris**, (Sir) William Snow. (1792-1867.) *An experimental illustration of a general law of electrical discharge.* 2 pp. 1 plate. ill. 4to. (*London, 1856*)
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- 1359.—*Rudimentary treatise on galvanism, and the general principles of animal and voltaic electricity.* xi+215 pp. ill. 12mo.
London, 1856
This treatise ranks among the best; the magnetic part is of special interest.
- 1359a.—*A new edition, revised with considerable additions by Robert Sabine.* vi+247 pp. ill. 12mo.
London, 1869
—See also 801.
1360. **Hearder**, J(onathan) N(ash). (1809-1876.) *On a powerful, modification of the static induction coil.* (Trans. Cornwall Polyt. Soc. 1856, pp. 1-14.) 8vo.
Cornwall, 1856
Function of the condenser in induction coils. (Autograph copy.)
—See also 2916.
1361. **Hughes**, (David) Edward. (1831-1900.) *Reading lessons, advanced series. Third book.* viii+430 pp. ill. 12mo.
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Chapters by Charles Vincent Walker on electricity, magnetism, and telegraphy.
—See also 2006bis, 3399.
1362. **Jacobi**, (Moritz) H(ermann) von. (1801-1874.) *Description d'un télégraphe, électrique naval, établi sur la frégate à vapeur le Polkan.* (Bull. Acad. Sc. Cl. Physico-Math. St. Petersburg, Vol. 14, pp. 145-150.) 3 plates. 8vo.
St. Petersburg, 1856
It is suggested to send signals by means of an electric bell.
—See also 907.
1363. **Knochenhauer**, K(arl) W(ilhelm). (1805-1875.) *Ueber die Theilung des elektrischen Stromes.* (Sitz. Ber. Akad. Wiss. Math. Nat. Kl., Vol. 22, pp. 327-331.) 8vo.
Vienna, 1856
Note on the division of a current in multiple arc.
—See also 1234.

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1364. Lamont, J(ohann) von. (1805-1879.) Het magnetismus der Aarde, populair beschreven, uit het Hoogduitsch vertaald door W. F. Kaiser; met eene voorrede en een bijvbeegsel, over het magnetismus der zon en maan, door F. Kayser. xvi+112 pp. 1 plate. 8vo. *Zwolle de Erven, 1856*
Popular account of the phenomena of terrestrial magnetism.
—See also 1049.
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Chapter on the application of the electric telegraph to astronomical purposes; experiments to determine the "velocity" of the electric current, p. 357.
—See also 1917, 2866.
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Various causes of summer lightning discussed.
—See also 1530, 3005.
1371. Schweigger, J(ohann) S(alomo) C(hristoph). (1779-1857.) Ueber Magnetismus in akustischer Beziehung. (Abh. Naturf. Ges., Halle, Vol. 3, pp. 145-190). 4to. *Halle, 1856*
Velocity of propagation of light, sound and certain electro-magnetic disturbances.
—See also 724.

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 Paper on duplex telephony.
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 Experiments with the electric egg.
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 —See also 1658, 1765, 2750.
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 —See also 1402bis, 1435bis, 1476, 3279.
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 Note on the strength and duration of electric currents.

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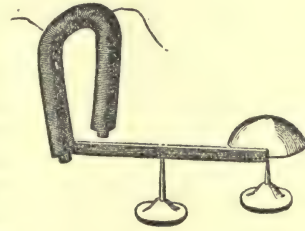
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Mechanical and electrical difficulties of making, laying and working a cable under the Atlantic; remarks on Maury's telegraphic plateau; induction coil used in transmitting signals through cables, p. 62.
—See also 3789.

the machine described in Silliman's Journal, vol. xx, 1831, and for the purpose of experimenting in regard to the second, I arranged around one of the upper rooms in the Albany Academy a wire of more than a mile in length, through which I was enabled to make signals by sounding a bell, (fig. 7.) The mechanical arrangement for effecting this object was simply a steel bar, permanently magnetized, of about ten inches in length, supported on a pivot, and placed with its north end between the two arms of a horse-shoe magnet. When the latter was excited by the current, the end of the bar thus placed was attracted by one arm of the horse-shoe, and repelled by the other, and was thus caused to move in a horizontal plane and its further extremity to strike a bell suitably adjusted.

Fig. 7.



This arrangement is that which is alluded to in Professor Hall's letter* as having been exhibited to him in 1832. It was not, however, at that time connected with the long wire above mentioned, but with a shorter one put up around the room for exhibition.

At the time of giving my testimony, I was uncertain as to when I had first exhibited this contrivance, but have since definitely settled the fact by the testimony of Hall and others that it was before I left Albany, and abundant evidence can be brought to show that previous to my going to Princeton in November, 1832, my mind was much occupied with the subject of the telegraph, and that I introduced it in my course of instruction to the Senior class in the Academy. I should state, however, that the arrangement that I have described was merely a temporary one, and that I had no idea at the time of abandoning my researches for the practical application of the telegraph. Indeed, my experiments on the transmission of power to a distance were superseded by the investigation of the remarkable phenomena, which I had discovered in the course of these experiments, of the induction of a current in a long wire on itself, and of which I made the first mention in a paper in Silliman's Journal in 1832, vol. xxii.

I also devised a method of breaking a circuit, and thereby causing a large weight to fall. It was intended to illustrate the practicability of calling into action a great power at a distance capable of producing me-

* See the Report of the Committee, page 96, and Proceedings of the Albany Institute, January, 1858.

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intensitaets-Messungen auf mechanisches Mass. (Abh.
Saechs. Ges. Wiss. Math.-Nat. Kl. Vol. 3, pp. 221-292.) L.
8vo.
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Absolute measurement of current-strength.
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Law of "square of length" as applied to the retardation of signals. Manu-
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—See also 1377.
1436. Bache, A(lexander) D(allas). (1806–1867.) Discussion of magnetic and meteorological observations. (1840–1845.) 12 parts. 20+26+14+76+70+41 pp. 4to. (Smithsonian Contributions to Knowledge.) Washington, 1859–1864
The observations were made at Girard College, Philadelphia, in coöperation with a plan of work adopted by British colonial observatories; discussion of the *decennial period*.
—See also 2700.
1437. Bacon, Roger. (1214–1294.) Opera quaedam hactenus inedita. Published by the authority of the Lords commissioners of Her Majesty's treasury, under the direction of the master of the rolls. Vol. I. (all published). (Halftitle:) Rerum britannicarum medii aevi scriptores, or, Chronicles and memorials of Great Britain and Ireland during the Middle Ages. cii+573 pp. 8vo. London, 1859
This volume contains the *Opus Tertium*, *Opus Minus* and *Compendium Philosophiae*; valuable preface by Professor Brewer. References to *Petrus Peregrinus*, pp. 35, 43, 46 (see also No. 46); also to the magnet, p. 537.
—See also 280.
1438. Beardmore, Septimus. The Globe Telegraph: an essay on the use of the earth for the transmission of electric signals. 47 pp. 8vo. London, (1859)
Working current derived from plates of copper and zinc buried in the earth at the ends of a telegraph line.
—See also 1481.
1439. Becquerel, (Alexandre) E(dmond). (1820–1891.) Recherches sur divers effets lumineux qui résultent de l'action de la lumière sur les corps; premier, deuxième et troisième mémoires. 5 plates. 8vo. Paris, 1859
Researches on phosphorescence, the author's phosphoroscope.
- 1440.—Recherches sur les causes de l'électricité atmosphérique et terrestre. 142 pp. 2 plates. 4to. Paris, 1859
Electric effects due to the contact of land and water.
—See also 1112, 1310, 1406, 2927.
1441. Bertelli, Timoteo. (1826–1905.) Registratore meteorologico elettro-scrivente. 26 pp. 4 plates. 8vo. Bologna, 1859
Self-registering apparatus for a meteorological station.
—See also 1311, 1711, 1792, 3717.

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1442. Blaserna, Pietro, Ernst Mach & Julius Peterin. Ueber elektrische Entladung und Induction. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., Vol. 37, pp. 477-524.) 4to. *Vienna, 1859*
Inductive effects in neighboring circuits.
—See also 1410, 1779, 2157.
1443. Boncompagni, (also Buoncompagni) (Ludovisi) Baldassare. (1821-1894.) Intorno ad un'opera di Ristoro d'Arezzo. Pubblicata dal E. Narducci. 8 pp. 4to. *Rome, 1859*
This tract of Ristoro d'Arezzo, said to have been written in 1282, contains a distinct reference, p. 7, to the use of the magnet for navigating purposes.
—See also 1094.
1444. Bosscha, J(ohannes) (The younger). Over eene algemeene eigenschap der lineaire verdeeling van galvanische stroomen. (Versl. Akad. Wetensch. Amsterdam, Vol. 9, pp. 53-58.) 8vo. *Amsterdam, 1859*
Division of the electric current.
- 1445.—Over de bepaling van het mechanisch aequivalent der warmte door galvanische metingen. (Versl. Akad. Wetensch. Amsterdam, Vol. 9, pp. 59-68.) 8vo. *Amsterdam, 1859*
Electric determination of the mechanical equivalent of heat.
—See also 1276.
1446. Breton, Philippe & Alphonse Beau de Rochas. Théorie mécanique des télégraphes sous-marins, recherches sur leurs conditions d'établissement. 72 pp. pl. 8vo. *Paris, 1859*
Inquiry into the best conditions for laying submarine cables.
1447. Castro, Manuel Fernandez de. (1825-1895.) L'électricité et les chemins de fer, description et examen de tous les systèmes proposés pour éviter les accidents sur les chemins de fer au moyen de l'électricité, précédés d'un résumé historique élémentaire de cette science et de ses principales applications. 2 vols. ill. tab. 8vo. *Paris, 1859*
Electric signaling and the prevention of railway accidents.
1448. Cox, Homersham. Submergence of telegraph cables. (Civil Engin. & Archit. Journ. Vol. 22, pp. 317-321.) 4to. *London, 1859*
Incidents that occurred while laying the Atlantic Cable; log of the *Agamemnon*. Also note on the stratified discharge by John Peter Gassiot.
1449. Deffand, (Marie de Vichy Chamrond) du. (1697-1780.) Correspondence inédite de Mme. du Deffand; précédée d'une notice par le marquis de Sainte-Aulaire. 2 vols. 8vo. *Paris, 1859*
Early reference to an electric dial-telegraph.
1450. De la Rive, (Auguste Arthur). (1801-1873.) Rapport sur les travaux de la Société de Physique et d'Histoire Naturelle de

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Genève de Juillet 1858 à Juin 1859. (Mém. Soc. Phys. d'Hist. Nat. Genève, Vol. 15, pp. 233-257.) 4to. *Geneva, 1859*

References to Volpicelli's work on induction; also the author's experiments on electrical discharge in rarefied media.

—See also 818.

1451. **Dickson, John.** Unity of the physical sciences; being an inquiry into the causes of gravitation and polarity, with an application of the results to some of the principal phenomena in each of the physical sciences. viii+87 pp. 8vo.

London, 1859

Undulating polarity is the cause of electricity; *constant* polarity produces magnetism.

1452. **Du Moncel, Th(éodore Achille Louis).** (1821-1884.) Notice sur l'appareil d'induction électrique de Ruhmkorff suivie d'un mémoire sur les courants induits. Fourth edition. x+400 pp. ill. 8vo. *Paris, 1859*

Experimental examination of the nature of the induced current.

- 1452a. —Fifth edition. xii+400 pp. ill. 8vo. *Paris, 1867*

1453. —Revue des applications de l'électricité en 1857 et 1858. 592 pp. 3 plates. 8vo. *Paris, 1859*

Supplement to the author's work in three volumes on the industrial applications of electricity covering the period 1857-1858; it treats of batteries, writing telegraphs, electric clocks, electric lamps, lightning-arresters.

—See also 1223.

1454. **Ganot, A(dolphe).** (1804-1887.) Cours de physique expérimentale et sans mathématiques à l'usage des gens du monde. 530 pp. ill. 8vo. *Paris, 1859*

The author's well known popular class-book on natural philosophy.

- 1454a. —(English translation.) Elementary treatise on physics, experimental and applied. Translated by E. Atkinson. Second edition, revised and enlarged. vii+799 pp. ill. pl. 8vo.

London, 1867

—See also 1356.

1455. **Gassiot, J(ohn) P(eter).** (1797-1877.) On the stratified electrical discharge as affected by a movable glass ball: (Civil Engin. & Archit. Jour. Vol. 22, p. 322.) 4to. *London, 1859*

Stratifications in a carbonic acid tube well developed at negative terminals, but indistinct and intermingled towards the positive end.

—See also 1641, 2819.

1456. **Grenet.** — Notice sur la pile électrique de M. Grenet dans les applications chirurgicales et sur les opérations que l'on peut faire avec cet instrument. Suivie de la description de son anse coupante à température constante. 39 pp. ill. 8vo.

Paris, 1859

The battery referred to is of the bichromate of potash type.

1457. **Hamel, (Joseph).** (1788-1862.) Historical account of the introduction of the galvanic and electro-magnetic telegraph into

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- England with comments thereon by W(illiam F(othergill) Cooke. 79+xv. pp. 12mo. *London, 1859*
 Chronological data about the electrical work of Soemmering, Schilling, Zamboni and Romagnosi; short account of the introduction of the electric telegraph into England by Cooke and Wheatstone.
 —See also 3186.
1458. **Hansteen**, (Christopher). (1784–1873.) Réduction des observations magnétiques de (Alexandre) E(dmond) Quetelet. (Bull. Acad. Sc., Belgique, N. S. Vol. 8, pp. 314–322.) 8vo. *Brussels, 1859*
 Determination of the horizontal magnetic component at Brussels.
 —See also 756.
1459. **Herschel**, (Sir) J(ohn) F(rederick) W(illiam) (1791–1871) & R(obert) Main. (1808–1878.) A manual of scientific enquiry; prepared for the use of Her Majesty's Navy and adapted for travellers in general. Third edition superintended by R(obert) Main. xviii+429 pp. pl. 12mo. *London, 1859*
 Articles on astronomy by Prof. Airy; tides by Prof. Whewell; terrestrial magnetism by Major-General Sabine, and earthquake phenomena by Robert Mallet.
 —See also 2578.
1460. **Lobb**, Harry William. On the curative treatment of paralysis and neuralgia and other affections of the nervous system with the aid of galvanism. Second edition. viii+152 pp. ill. 12mo. *London, 1859*
1461. **Maury**, M(atthew) F(ontaine). (1806–1873). Physical geography of the sea. New edition. xxiv+352 pp. 13 charts. 12mo. *London, 1859*
 This edition contains a chapter on the laying of the Atlantic cable.
 —See also 4542.
1462. **Narducci**, Enrico. (1832–1893.) La composizione del mondo di Ristoro d'Arezzo testo Italiano del 1282. lxxxiii+384 pp. 8vo. *Rome, 1859*
 Early reference by Ristoro d'Arezzo to the mariner's compass, p. 10.
1463. **Noad**, Henry M(inchin). (1815–1877.) Manual of electricity, including galvanism, magnetism, diamagnetism, electro-dynamics, magneto-electricity, and the electric telegraph. Fourth edition. iv+910 pp. ill. 8vo. *London, 1859*
 Extensive experimental treatment of the subject, preceded by a brief historical sketch; first edition 1855. (See No. 5526.)
 —See also 1065.
1464. **Reitlinger**, Edmund. (1830?–1882.) Ueber fluessige Isolatoren der Elektricitaet. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., Vol. 35, pp. 73–104.) 8vo. *Vienna, 1859*
 Paper on the use of certain liquids as insulators.
 —See also 1498, 1553, 1582, 3360.
1465. **Rowell**, G(eorge) A(ugustus). Essay on the cause of rain and its allied phenomena. viii+166 pp. 1 plate. 8vo. *Oxford, 1859*
 Interesting matter on the various phenomena of electric storms: the author's

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theory, p. 17; Beccaria's experiments, p. 30; extracts from Beccaria's work on atmospheric electricity, p. 408. (See No. 375.)

—See also 1500, 1955, 2254, 2389, 3738.

1466. **Scoresby**, W(illiam). (1789–1857.) *Journal of a voyage to Australia and round the world, for magnetic research*; edited by Archibald Smith. xlviii+96+315 pp., map, portr., tab. diagrs. 8vo. *London, 1859*

In the introduction, Mr. Archibald Smith gives a brief history of the deviation of the compass and discusses the methods in use for its correction. This is followed by Scoresby's exposition of the disturbance which the compass experiences in iron ships.

—See also 805.

1467. **Shaffner**, Tal(iaferro) P(reston). (1818–1881.) *Telegraph manual, a complete history and description of the semaphoric, electric and magnetic telegraphs of Europe, Asia, Africa and America ancient and modern*. 850 pp. ill. 10 portraits. 8vo. *New York, 1859*

Includes detailed description of the laying of the first Atlantic cable.

—See also 3206.

1468. **Sonntag**, August. *Observations on terrestrial magnetism in Mexico*. With notes and illustrations of an examination of the volcano Popocatepetl and its vicinity. 84 pp. 1 plate. 4to. (Smithsonian Contributions to Knowledge.) *Washington, 1859*

The magnetical observations were made by Mr. Sonntag, with a set of instruments furnished by the Smithsonian Institution to Baron von Mueller.

—See also 3139.

1469. **Tomlinson**, Charles. (1808–1897.) *The thunderstorm; an account of the properties of lightning and of the atmospheric electricity in various parts of the world*. xii+348 pp. ill. 12mo. *London, (1859)*

Work replete with facts and information; magnetic effects of lightning, p. 71; aurora borealis, p. 303.

—See also 948.

1470. **Willigen**, V(olkert) S(imon) M(aarten) van der. (1822–1878.) *Over de kleur eener blaauw aangeloopen stalen veêr in gepolariseerd licht*. (Versl. Akad. Wetensch., Amsterdam. Vol. 9, pp. 257–264.) 8vo. *Amsterdam, 1859*

Brief statement of the properties of polarized light.

—See also 1304.

1471. **Rees**, R(ichart) van. (1797–1875.) *Ober de zijdelingsche ontlading der electriciteit*. (Extract, Versl. Akad. Wetensch., Amsterdam, Vol. 9.) 10 pp. 8vo. *Amsterdam, 1859*

The Leyden jar discharge.

—See also 3153.

1472. (**West**, Charles.) (1816–1898.) *The story of my life; by the submarine telegraph*. 96 pp. 8vo. *London, 1859*

Humorous production containing many curious facts.

—See also 3271.

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Lecture of literary merit on the electric telegraph.
—See also 1244.
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Some causes of the failure of the 1858 cable; construction and submergence of the cable.
—See also 1307.
1475. Zantedeschi, Francesco. (1797-1873.) L'elettromagnetismo rivendicato a Giandomenico Romagnosi, e all'Italia. (Extract Corrisp. Scient. V, Roma 1859, pp. 245-250.) 16 pp. 8vo. *Trent, 1859*
Vindication of the claim of Romagnosi to the discovery in 1802 of the magnetic action of a battery current.
—See also 950.
1476. Allan, Thomas. Allan's systems of cheap telegraphy. 12+17 pp. 12mo. *London, 1860-1861*
Government ownership of telegraphs; telegraphic reform.
—See also 1377.
1477. Ansted, D(avid) T(homas). (1814-1880.) The bottom of the Atlantic and the first laying of the electric telegraph cable. 24 pp. 8vo. *Guernsey, 1860*
1478. D'Avezac (-Macaya, Marie Armand Pascal.) (1799-1875.) Aperçus historiques sur la boussole et ses applications à l'étude des phénomènes du magnétisme terrestre. (Bull. Soc. Géograph. Vol. 19, pp. 346-361.) 8vo. *Paris, 1860*
Magnetic discoveries of *Petrus Peregrinus*.
—See also 1403.
1479. Babinet, (Jacques.) (1794-1872.) Études et lectures sur les sciences d'observation et leurs applications pratiques. Vol. vi. 16mo. *Paris, 1860*
These studies contain a paper of considerable literary merit on terrestrial magnetism. (Complete in 7 vols., 1855-1863.)
1480. Baxter, H(enry) F(orster). On organic polarity; shewing a connection to exist between organic forces and ordinary polar forces. viii+187 pp. 12mo. *London, 1860*
Electricity is said to be due to animal and vegetable life.
—See also 2955.
1481. Beardmore, Septimus. Terra-voltaism as applied to submarine telegraphs. 51 pp. 12mo. *London, 1860*
A "terra-voltaic" couple consists of a plate of zinc and another of copper sunk in the ground.
—See also 1438.
1482. Bezold, Wilhelm (Johann Friedrich) von. (1837-1907.) Zur Theorie des Condensators. 60 pp. 8vo. (Inaugural dissertation.) *Gottingen, 1860*
Mathematical theory of condensers.
—See also 3430.

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Paris, 1860
Loss of electric charge on a conductor due to its supports and the surrounding air.
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The aurora borealis of August 29, 1859 and its effect on the telegraph system of the world.
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Short chapter on electricity and magnetism.
—See also 1170.
1486. Du Moncel, Th(éodore) Achille Louis. (1821-1884.) Étude des lois des courants électriques au point de vue des applications électriques. x+201 pp. 8vo. *Paris, 1860*
Application of Ohm's law to the arrangement of cells as required to meet various practical conditions.
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The discharge of an induction coil under varying conditions.
—See also 1223.
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This edition has a short preface by (Sir) William Crookes.
- 1488a.—(Another edition.) 200 pp. ill. 12mo. *London, (1874)*
—See also 787.
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Work of purely engineering interest.
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General application of thermodynamical theory to heat-engines.
1491. Lamont, (Johann) von. (1805-1879.) Sur le magnétisme terrestre et l'aurore boréale. (Lettre à (Lambert) Ad(olphe Jacques) Quetelet). (Extract Bull. Acad. Sc., Belgique, Ser. II. Vol. 8.) 31 pp. 8vo. *Brussels, 1860*
A possible explanation of the relation existing between sun-spots and magnetic disturbances.
- 1492.—Magnétisme terrestre. (Extract, Bull. Acad. Sc., Belgique, Ser. II, Vol. 9.) 4 pp. 8vo. *Brussels, (1860?)*
Note on the annual variation of the horizontal component of the earth's magnetic force.
—See also 1049.

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Among the contributors to this encyclopaedia were Professors William Rowan Hamilton, Rankine, Stokes and Thomson (Lord Kelvin).
1494. **Nicklès, (François Joseph) J(érôme).** (1820-1869.) *Les électro-aimants et l'adhérence magnétique.* vii+302 pp. 5 plates. 8vo. *Paris, 1860*
The construction of electro-magnets with numerous original observations.
—See also 1265.
1496. **Preece, (Sir) William Henry.** On the maintenance and durability of submarine cables in shallow waters. With an abstract of the discussion upon the paper by Charles Manby and James Forrest. (Extracts, Proc. Instit. Civil Engin. Vol. 20.) 82+28+14 pp. 1 plate. 8vo. *London, 1860-1862*
Remarks by Siemens, Latimer Clark, Sir Charles Bright, Willoughby Smith on the durability of gutta percha and the failure of cables.
—See also 1580, 1604, 1619, 1652, 1998, 2249, 2278, 3556.
1497. **Prescott, George B(artlett).** (1831-1894.) *History, theory and practice of the electric telegraph.* xii+468 pp. ill. 8vo. *Boston, 1860*
The aurora borealis, p. 309; auroral current used in signaling, p. 318; telegraphic chronology, p. 404; poems on telegraphic subjects, pp. 232 and 352.
—See also 2045, 2097, 2164, 2372, 2378, 5077.
- 1497† **bis. Reis Publications..** Collections of 7 original articles in German. 8vo. *1860-1873*
1. Schenk. Philipp Reis, der Erfinder des Telephones. 16 pp. ill. Frankfurt, a. M. 1878.—2. Two advertisements signed Philipp Reis, one reads "Das Telephon, Ill."; the other is an invitation to subscribe for the apparatus. Both are dated Friedrichsdorf, August, 1863.—3. Advertisement signed J. Wilhelm Albert, dealer in scientific apparatus, dated Frankfurt, a. M., August 1863.—4. List of members of the Physical Society. Philipp Reis's name appears on page 5.—5. Reis, Philipp. Ueber Telephonie durch den galvanischen Strom. (Jahresbericht des Physikalischen Vereins, Frankfurt a. M. 1860-1861, pp. 57-64) dated Dec. 1861. (This article bears a note as follows: "I hereby certify that I have personally been present at the telephonic singing experiment of my friend Philipp Reis, mentioned in the above paper, and that I actually took part in the experiment, which was made in the lecture (or experimental) room of our Physical Society." (Signed) Dr. Boettger, Frankfurt 25. Febr. 1880.—6. Verzeichniss der physikalischen Apparate verfertigt bei J. Wilhelm Albert. 64 pp. Frankfurt a. M. 1866. Reis apparatus is listed on page 51 as No. 839, price fl. 21.00.—7. Another edition of the former Verzeichniss (No. 6) 91 pp. ill. Frankfurt a. M. 1873. (Reis apparatus is listed on page 67 as Nos. 957 and 958, with prices Rmk. 36.00 and 45.00.)
—See also 1532bis, 2059bis.
1498. **Reitlinger, Edmund.** (1830?-1882.) *Ueber Leitung der Electricitaet.* 27 pp. 12mo. *Vienna, 1860*
The beginnings of electric telegraphy; the "Scots Magazine," 1753 (see No. 378); Watson's Westminster-bridge experiment, 1747. (See No. 352.)
—See also 1464.

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Difficulties attending the laying and working of an Atlantic cable.
1500. **Rowell, G(eorge) A(ugustus).** A lecture on the storm in Wiltshire, which occurred on the 30th of December, 1859. 45 pp. 1 plate. 8vo. *Oxford, 1860*
The author holds that electricity is the principal agent in all meteorological phenomena.
—See also 1465.
1501. **Sainte-Anne, Vêrard M. de,** (also Vêrard de Sainte-Anne). Ligne de télégraphe, Europe, Asie, Afrique, Océanie, Amérique. Sections de Mossoul à Haiderabad, de Calcutta à Bangkok et Singapour. 32 pp. 1 map. 8vo. *Paris, 1860*
Brief description of the various sections of the Indo-European telegraph line with map.
1502. **Siemens, (Ernst) Werner (1816–1892) & (Sir) Charles William Siemens, (1822–1883.)** Outline of the principles and practice involved in dealing with the electrical conditions of submarine electric telegraphs. 7 pp. 4to. *London, 1860*
Paper read at the British Association meeting of 1860. (Autograph copy.)
- 1502a.—(The same paper.) (Civil Engin. & Archit. Journ. Vol. 23, pp. 264–269.) 4to. *London, 1860*
—See also 1214, 1654.
1503. **Tucker, James.** The reformed Roman or Oriental baths, reviewed as thermo-electrical temples of health, with medical remarks on the nature and scientific treatment of cattle distemper by the hot air baths. 36 pp. 8vo. *Dublin, 1860*
Paper advocating the improvement of the sanitary condition of the people.
1504. **Willigen, V(olkert) S(imon) M(aarten) van der.** (1822–1878.) Over de kleuren van gemengde plaatjes (mixed plates van Young). (Versl. Akad. Wetensch. Amsterdam, Vol. 10, pp. 37–414.) 1 plate. 8vo. *Amsterdam, 1860*
Paper by the eminent Dutch physicist on interference phenomena.
- 1505.—Over elektrische ontlading in het luchtledige. (Versl. Akad. Wetensch. Amsterdam, Vol. 10, pp. 291–296.) 8vo. *Amsterdam, 1860*
Electric discharge in vacuum tubes.
—See also 1304.
1506. **Weisse, M(aximilian).** (1798–1863.) Variation der Declination der Magnetonadel beobachtet in Krakau. (Denkschriften, Akad. Wiss. Math.-Nat. Kl., Vol. 18, pp. 63–98.) 4to. *Vienna, 1860*
Observations of change in magnetic declination made at Cracow, 1839–1856.

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The phenomena of electricity explained on the assumption that we are endowed with a special percipient organ.
1508. **Burnett, William Hickling.** *The electric telegraph; and the patented improvements thereon.* 27 pp. 8vo. *London, 1861*
Account of the author's improvements in electric telegraphs.
1509. **Clark, (Josiah) Latimer.** (1822-1898.) *Experimental investigation of the laws which govern the propagation of the electric current in long submarine telegraph cables.* (Reprinted from Government Report on Submarine Cables, 1861.) 48 pp. 1 plate. Folio *London, 1861*
Phenomena due to the passage of a current through submarine cables chiefly treated; retardation of signals.
—See also 1566, 1715, 1934, 1970, 2133, 2272, 2897.
1510. **Clark, (Josiah) Latimer** (1822-1898) & (Sir) **Charles (Tilston) Bright** (1832-1888). *On the principles which should be observed in the formation of standards of measurement of electrical quantities and resistance.* (Atlantic and Government Report on Submarine Cables, pp. 49-50.) Folio. *London, 1861*
The principles refer to the units of e. m. f., quantity, current and resistance. (See No. 3686a.)
—See also 1509, 1639.
1511. **Cochius, Hermann.** (Koch.) *De luce electrica.* 66 pp. 8vo. *Berlin, 1861*
(Inaugural dissertation.)
Nature of the spark discharge; also phenomena observed in vacuum tubes.
1512. **Dellmann, (Johann) F(riedrich) G(eorg).** (1805-1870.) *Elektrische Untersuchungen.* (Zeitschr. Math. Phys. Vol. 6, pp. 246-260.) 8vo. *Leipzig, 1861*
Paper on atmospheric electricity.
—See also 1013.
1513. **Dircks, Henry.** (1806-1873.) *Perpetuum mobile; or Search for self-motive power during the 17th, 18th and 19th centuries.* Illustrated from various authentic sources, in papers, essays, letters, paragraphs and numerous patent specifications. With an introductory essay. xli+558 pp. ill. 1 plate. 12mo. *London, 1861*
Work embodying wide research: attempts at perpetual motion by means of magnets, pp. 5, 18, 329, 367, 394.
—See also 1568.
1514. **Dodwell, Robert.** *Illustrated handbook to the electric telegraph.* iv+80 pp. 8vo. 8 plates. 8vo. *London, (1861)*
Popular treatment of the electric telegraph.
- 1514a.—*Second edition.* 80 pp. 8 plates. 12mo. *London, 1862*
—See also 5352.

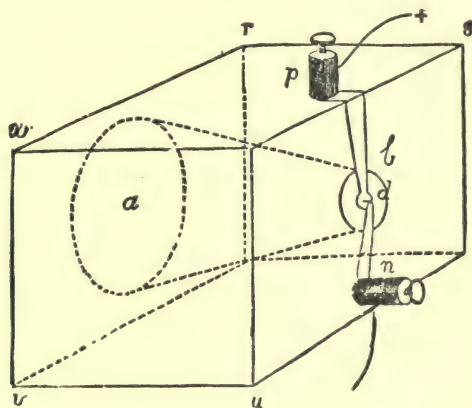
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1515. **Dub**, (Christoph) Julius. (1817-1873.) Der Elektromagnetismus. xxii+516 pp. ill. 8vo. *Berlin, 1861*
Electromagnetics and electro-magnetic instruments.
- 1515a.—Die Anwendung des Magnetismus, mit besonderer Beruecksichtigung der neueren Telegraphie und der in der deutschen Telegraphen-Verwaltung bestehenden technischen Einrichtungen. Second edition. (Zweite vollstaendig neu bearbeitete und unter Beruecksichtigung der Fortschritte der Wissenschaft ergaenzte Auflage des vorstehenden Werkes.) xx+857 pp. ill. 8vo. *Berlin, 1873*
—See also 1253.
1516. **Du Bois-Reymond**, E(mil Heinrich). (1818-1896.) Zur Theorie der astatischen Nadelpaare. (Ann. Phys. Chem., Vol. 112, pp. 1-14.) 1 plate. 8vo. *London, 1861*
Theory of the astatic pair of needles. (See No. 1903.)
—See also 1172.
1517. **Elias**, P. (1809-1878.) Over het vermogen der magneto-electrische machine. (Versl. Akad. Wetensch., Amsterdam, Vol. 11, pp. 69-78.) 8vo. *Amsterdam, 1861*
Theory of the author's famous "magneto-electric" machine.
—See also 1015.
1518. **Erckmann**, Jules. Établissement de lignes électriques sous-marines, sans cables sous-marins. 14 pp. 8vo. *Paris, 1861*
The author recommends brass conductors for sub-fluvial cables.
1519. **Gavarret**, (Louis Dominique) J(ules). (1809-1890.) Télégraphie électrique. 428 pp. ill. 12mo. *Paris, 1861*
General description of the principles and apparatus used in telegraphy. The earth used for the first time as return circuit, p. 2; O'Shaughnessy's cable of 1839, p. 25.
—See also 1042.
1520. **Gloesener**, M(ichael). (1794-1876.) Traité général des applications de l'électricité. Vol I. 8vo. *Paris, 1861*
The various systems of telegraphy and apparatus used described; lightning arresters, chronoscopes, etc.
—See also 1095.
1521. **Gmelin**, Leopold. (1788-1853.) Handbook of chemistry. Translated by Henry Watts. Second edition. Vol. I. 4 plates. 8vo. *London, 1861*
A considerable part of the volume is devoted to such subjects as the relation of light to magnetism; magnetic condition of all matter, phenomena of electrolysis.
1522. **Greiss**, C(arl) B(ernhard). Zur Geschichte des Magnetismus. 18 pp. 4to. (Programm.) *Wiesbaden, 1861*
Historical sketch of magnetism.
1523. **Guillemin**, C(laude) M(arie). (1822-1890.) Recherches expérimentales sur l'induction Volta-électrique. 69 pp. 1 plate. 4to. (Thèse.) *Montpellier, 1861*
Induced currents: their properties and mode of production.
—See also 2983.

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1524. **Hankel**, W(ilhelm) G(ottlieb). (1814-1899.) Elektrische Untersuchungen. Fuenfte & Sechste Abhandlung. Maasbestimmungen der elektromotorischen Kraefte. Erster und Zweiter Teil. (Abh. Saechs. Ges. Wiss. Math.-Nat. Kl., Vol. 6, pp. 1-52; Vol 7, pp. 585-693.) 4to. *Leipzig, 1861-1865*
Absolute determination of c. m. f.
—See also 1613, 2324, 3187.
1525. **Marié-Davy**, E(dme) H(ippolyte). (1820-1893.) Recherches théoriques et expérimentales sur l'électricité considérée au point de vue mécanique. 96 pp. 8vo. *Paris, 1861*
The voltameter considered as a measurer of current-strength; also "velocity of electric propagation."
- 1526.—Résumé des recherches sur l'électricité. 60 pp. 8vo. *Paris, 1861*
Abstracts of various memoirs on electricity written by the author.
—See also 1182.
1527. **Matteucci**, Carlo. (1811-1868.) Manuale di telegrafia elettrica. xi+394 pp. 3 tables. 12mo. *Turin, 1861*
Chapters on military and submarine telegraphs.
—See also 985.
1528. **Pepper**, John Henry. (1821-1900.) Scientific amusements for young people. iv+124 pp. ill. 12mo. *London, 1861*
The experiments are mainly chemical, electric and magnetic; Prof. Pepper was a popular lecturer and writer on elementary science.
—See also 1751, 1874, 1991, 3609.
1529. **Perrot**, Adolphe. (1833-1887.) Recherches sur l'action chimique de l'étincelle d'induction de l'appareil Ruhmkorff.—Sur la nature de l'étincelle d'induction de l'appareil Ruhmkorff. 65 pp. 1 plate. 4to. (Thèse.) *Paris, 1861*
The electrolytic effect of the spark from an induction coil.
1530. **Poey**, André. Relation historique et théorie des images photo-électriques de la foudre observées depuis l'an 360 de notre ère jusqu'en 1860. Second edition. 110 pp. 16mo. *Paris, 1861*
Photo-electric effects of lightning gathered from writers covering the fifteen centuries previous to the year 1860.
—See also 1370.
1531. **Predieri**, P. C. Di alcuni autografi di Luigi Galvani ultimamente rinvenuti. (Mem. Accad. Sc., Bologna, Vol. 12, pp. 21-40.) 4to. *Bologna, 1861*
The author describes several manuscript works of Galvani relating to electrical matters.
1532. **Reis**, (Johann Phillipp). (1834-1874.) Ueber Telephonie durch den galvanischen Strom. (Jahresber. Phys. Ver. Frankfurt a/M. 1860-1861, pp. 57-64.) ill. 8vo. *Frankfort, 1861*
The author's telephone of 1861, the first successful attempt at transmitting sounds electrically.
—See also 1497b, 1532bis, 2059bis.

With the above principles as a foundation, I have succeeded in constructing an apparatus with which I am enabled to reproduce the tones of various instruments, and even to a certain extent the human voice. It is very simple, and by means of the figure will be easily understood from the following explanation : —



In the cubical block of wood $r s t u v w x$ there is a conical perforation a , closed at one end by a membrane b (pig's intestine), upon the middle of which there is cemented a conducting strip of platinum; this is connected with the binding screw p [auf deren Mitte ein stromleitendes Streifchen Platin festgekittet ist. Dieses steht mit der Klemme p in Verbindung]. From the binding screw n , another thin strip of metal [ein dünnes Metallstreifchen] extends until over the middle of the membrane, and ends here in a platinum wire placed at right angles to its length and surface.

From the binding screw p , a conducting wire runs through the battery to distant station, being connected with a coil of silk-covered copper wire and this again is connected with a conductor leading back to the binding screw n .

The coil at the distant station is about six inches long, is composed of six layers of fine wire, and, as a core in its centre, has a knitting-needle which projects about two inches at both ends. By means of the projecting ends, the coil rests upon two bridges of a resonant case. (All this part can, of course, be replaced by

1532bis. REIS. (Translation of a portion of a paper by Reis, dated December, 1861.)

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1532[†]bis. Reis Publications: Collection of 53 articles from various periodicals, etc., as below. Those in foreign languages are translated into English. 1861-1877

1. Frankfurter Conversationsblatt, Nov. 29, 1861. "Reproduction des Schales durch den galvanischen Strom" (Frankfurt). (Report of Reis's lectures of October and November, 1861).—2. Jahresbericht des Physikalischen Vereins zu Frankfurt am Main, fuer das Rechnungsjahr 1860-1861, pp. 57-64 (Published in 1862). "On telephony by means of the galvanic circuit current, by Philipp Reis." (Reis's lectures revised by himself).—3. Jahresbericht des Physikalischen Vereins zu Frankfurt am Main: fuer das Rechnungsjahr 1861-1862. Extract of the notice of the two lectures by Reis, Oct. 26 and Nov. 16, 1861.—4. Die Fortschritte der Physik, XVII., for 1861, pp. 171-173. Article entitled "Ph. Reis: Telephony by means of the Electric current (Annual report of the Physical Society of Frankfort-on-the-Main, 1860-1861, pp. 57-64)."—5. Aus der Natur, Vol. 21, pp. 470-474, Leipzig, 1862. (Abstract of Reis's Lecture of 1861, with quotations from it).—6. Didaskalia, May 8 and May 12, 1862. Extract copied from book of Sylvanus P. Thompson. (Reis exhibitions of May, 1862, before the Frei Deutsches Hochstift.) 7. Zeitschrift des Deutsch-Oesterreichischen Telegraphen-Vereins Berlin, Vol. 9, pp. 125, 1862. Legat article.—8, 9, 10. Deutsche Industrie-Zeitung, 1863, Chemnitz. Three articles from different numbers: No. 16, p. 184, April, 17, 1863; No. 18, p. 208, May 1, 1863; No. 22, p. 249, May 29, 1863.—11. Boettger's Polytechnisches Notizblatt, 1863, No 61, p. 81. "On the transmission of tones to any desired distance by means of electricity. (Apparently an abstract of Reis's lecture).—12. Frankfurter Conversationsblatt, June 30, 1863. (Reprint of the Boettger article.)—13. Dingler's Polytechnisches Journal, Vol. 168, p. 185. (Reprint of the Boettger article.)—14. Polytechnisches Contralblatt, 1863, pp. 857-859. (Reprint of the Boettger article).—15. Jahresbericht des Physikalischen Vereins zu Frankfurt-am-Main: fuer das Rechnungsjahr 1862-1863, p. 35. Memorandum of lecture of Reis, July 4, 1863—(the same) 1869-1870, p. 26. (Mention of the Reis lecture of 1861.)—16. Reis's letter to Ladd, July 13, 1863. Original on the Library of the Society; printed in the Journal of the Society of Telegraph Engineers and Electricians, for March, 1863, No. 46.—17. Report of British Association Meeting, from The Newcastle Daily Chronicle and Northern Counties Advertiser, Saturday, August 29, 1863. (Refers to paper of Ladd, noted below.)—18. The Civil Engineer and Architect's Journal, Vol. 26, pp. 307-308, 1863. "Acoustic telegraph," by W. Ladd. A paper read to the British Association, 1863.—19. Report of the thirty-third meeting of the British Association for the Advancement of Science, in August and September, 1863; published in 1864.—20. Prospectus of J. Wilh. Albert, Frankfort-on-the-Main, August, 1863.—21. Reis's circular of August, 1863.—22. Reis's descriptive circular, 9 August, 1863.—23. Dingler's Polytechnisches Journal, Vol. 169, p. 23. Reprint of Legat article.—24. Boettger's Polytechnisches Notizblatt, 1863, No. 5, p. 225. Boettger's account of Reis's improved apparatus, copied in the three following journals.—25. Dingler's Polytechnisches Journal, Vol. 169, p. 399.—26. Die Fortschritte der Physik, 1863, p. 96; and in 27. Dublin Medical Press, Oct. 14, 1863.—28. Cosmos. Weekly encyclopaedic review of the progress of the sciences, Paris, Dec. 25, 1863, Vol. 23, p. 705. "Note by M. Koenig."—29. Zeitschrift des Architectur und Ingenieur Vereins (Journal of the Society of Architects and Engineers for the Kingdom of Hanover), Vol. 12, p. 147. Dublin Medical Press article condensed.—30. Die Gartenlaube (An illustrated weekly paper of Leipzig), No. 51, Dec. 1863, "Der Musiktelegraph." Apparently an abstract of previous articles, with cuts.—31. Cosmos. Vol. 24, pp. 349, 352, Paris, March 22, 1864. Long article, purporting to be written from Koenig's establishment.—32. Portefeuille Economique des Machines, Paris, 1864,

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Vol. 9, p. 101. Second Saint-Edme article.—33. Tagesblatt der 29. Versammlung Deutscher Naturforscher, Giessen, September, 1864. From Sylvanus P. Thompson's book, and there entitled "Extract from the Report of the German Naturalist's Society, held at Giessen (1864).—34. Proceedings of the Literary and Philosophical Society of Manchester, Published at Manchester, 1865. Notice of Reis's telephone, by Prof. Clifton.—35. Annalen der Chemie und Pharmacie, 1864-1865. Foot-note of Burr article.—36. Koenig's Description of the Reis telephone. From Koenig's catalogue des appareils d'acoustique. Paris, 1865, p. 5.—37. Pisko. Die neueren Apparate der Akoustik. Vienna, 1865, pp. 94 *et seq.*—38. Pisko. Die neueren Apparate der Akoustik, Vienna, 1865, p. 241. The Reis prospectus.—39. Handbuch der angewandten Elektricitaetslehre, von Karl Kuehn, 1865, pp. 1017-1021.—40. Hessler description of Reis telephone. Hessler's Lehrbuch der technischen Physik (Technical Physics), Vienna, 1866, Vol. 1, p. 648.—41. Catalogue of J. Wilh. Albert, Mechanician at Frankfort-on-the-Main, 1866. (Contains illustrations of Reis telephone.) 42. "Electricity," by Robert M. Ferguson, Edinburgh and London, 1867, p. 257.—43. Lehrbuch der Physik und Meteorologie (Text-book of Physics) von Joh. Mueller. Siebente Auflage, Zweiter Band, 1868, pp. 386-389.—44. The Manufacturer and Builder, May 1869, Vol. 1, No. 5, pp. 129, 130. Article by Dr. Van der Weyde on Reis telephone.—45. The Telegrapher, Vol. 5, No. 39. New York, 1869. (Reprint of Van der Weyde's article.)—46. American Association on Reis. Paper read by Dr. Van der Weyde at meeting of the American Association for the Advancement of Science, at Salem, August, 1869.—47. Boston Daily Advertiser, Aug. 25, 1869. Notice of the foregoing meeting.—48. The Wonders of electricity. Translated from the French of J. Baille. New York: Scribner, Armstrong & Co., 1872, pp. 140-143.—49. Zoellner's Das Buch der Erfindungen, Gewerbe und Industrien; Leipzig, 1872.—50. Albert's catalogue of 1873.—51. Wiedemann's Die Lehre vom Galvanismus, 1874, Vol. 2, pp. 598, 599.—52. Scientific American, March 4, 1876, Dr. Van der Weyde's second article.—53. Official report of exhibition at South Kensington in 1876, edited by Dr. Rudolph Biedermann, published in 1877. Notice of the Reis apparatus exhibited.

- 1532† bis. Reis Publications. Die Gartenlaube. Leipzig. No. 51, (December) 1863, pp. 807-809.—The Manufacturer and Builder. New York. Vol. I, No. 5, May. 1869, pp. 129-130.

Leipzig, 1863; New York, 1869

The article in the *Gartenlaube* describing and illustrating the Reis telephone, is apparently based upon previous publications; there were about 35 publications on the subject prior to 1864. The illustrated article in the *Manufacturer and Builder* on the Reis telephone is supposed to have been written by Dr. Van der Weyde.

—See also 1497bis.

1533. Renard, N(icolas) A(imé). Théorie de l'induction en partant de l'hypothèse d'un seul fluide. (Mém. Acad. de Stanislas.) 34 pp. 8vo. *Nancy, 1861*
Induced currents and mathematical theory.
—See also 3362.
1534. Saward, George. Deep-sea telegraphs: their past history and future progress. 48 pp. 8vo. *London, 1861*
—See also 2102.
1535. Sharpe, Benjamin. Treatise on the construction and submersion of deep-sea electric telegraph cables. 16 pp. 2 plates. 8vo. *London, 1861*

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1536. **Volpicelli, P(aolo).** (1804-1879.) Sulla elettricità dell' atmosfera. (Extract, Atti Accad. Nuovi Lincei, Ann. 14.) 44 pp. 4to. *Rome, 1861*
Result of researches on atmospheric electricity, using points and flames as collectors.
—See also 1399.
1537. **Wiedemann, Gustav (Heinrich).** (1826-1899.) Die Lehre vom Galvanismus und Elektromagnetismus nebst ihren technischen Anwendungen. 2 vols. ill. 8vo. *Brunswick, 1861*
Text-book of electricity and magnetism.
—See also 2305, 3219.
1538. **Bond, R.** Handbook of the telegraph. Being a manual of telegraphy, telegraph clerk's remembrancer, and guide to candidates for employment in the telegraph service. 68 pp. ill. 12mo. *London, 1862*
Manual of practical instruction.
- 1538a.—Second edition, revised and enlarged. To which is appended questions on magnetism, electricity and practical telegraphy by W. McGregor. 178 pp. 12mo. (Weale's Rudimentary Series, No. 138.) *London, 1873*
1539. **Crova, André.** Mémoire sur les lois de la force électromotrice de polarisation. 41 pp. 1 plate. 4to. (Thèse) *Metz, 1862*
The e. m. f. of polarization was studied by means of a water voltmeter.
1540. **Dub, (Christoph) Julius.** (1817-1873.) Ueber den Einfluss der Dimensionen des Eisenkernes auf die Intensität der Elektromagnete. 48 pp. 8vo. (Reprint Ann. Physik. Chem. Vol. 115.) 8vo. *Berlin, 1862*
Brief research on the influence of the dimensions of the iron core of an electromagnet on the magnetism developed.
—See also 1253.
1541. **Du Bois-Reymond, (Emil Heinrich).** (1818-1896.) Ueber den zeitigen Verlauf voltaelektrischer Induktionsstroeme. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., 1862, pp. 372-404.) 8vo. *Berlin, 1862*
Mathematical theory of the induction coil.
—See also 1172.
1542. **Elliot, Robert John.** On the magnetic combinations with some observations on the action of selenic acid on methyl-alcohol. 44 pp. 8vo. (Inaugural dissertation.) *Göttingen, 1862*
Paper on the oxides of certain magnetic substances.
1543. **Escayrac, de Lauture, de.** (1822-1868.) Analytic universal telegraphy; an international telegraphic language, simple, accurate, and three times shorter than the system at present in use. 20 pp. 12mo. *London, 1862*
Description of the author's system of signals.

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- 1544.—De la transmission télégraphique et de la transcription littérale des caractères chinois. 2 parts. 28 pp. ill. 3 plates. 4to. *Paris, 1862*
The electric transmission of messages in the Chinese language.
1545. **Evans**, (Sir) F(rederic) J(ohn) O(wen) (1816–1886) and A(rchibald) **Smith**. (1813–1872.) Admiralty manual for ascertaining and applying the deviations of the compass caused by the iron in a ship. With a preface by J. W. (*i. e.*, John Washington). 166 pp. 3 maps, 2 diagr. 8vo. (Published by order of the Admiralty.) *London, 1862*
Compass correction treated both theoretically and practically.
- 1545a.—Fourth edition. 11+199 pp. 6 plates, 3 maps. 8vo. *London, 1874*
—See also 1702, 2138.
1546. **Garnier**, C. F. Méthode mnémonique pour retinir facilement les signes de l'écriture télégraphique de Morse. 14 pp. 8vo. *Neuchatel, 1862*
How to learn and remember the Morse alphabet.
1547. **Gibbs**, Joseph. Cotton cultivation in its various details, the barrage of great rivers and instructions for irrigating, embarking, draining, and tilling land in tropical and other countries possessing high thermomatic temperatures, especially adapted to the improvement of the cultural soils of India. viii+248 pp. 5 plates. 8vo. *London, 1862*
1548. **Kirchoff**, G(ustav) R(ober) (1824–1887.) Researches on the solar spectrum and the spectra of the chemical elements; translated with the author's sanction from the Transactions of the Berlin Academy for 1861 by Henry E. Roscoe. iv+36 pp. 3 plates. 4to. *Cambridge, 1862*
This important memoir is accompanied by two lithographic maps of the lines in a part of the solar spectrum, showing coincidences with lines of metallic spectra.
—See also 2196.
1549. **Knochenhauer**, K(arl) W(ilhelm). (1805–1875.) Ueber Fluesigkeiten im elektrischen Strom. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl. 1862, pp. 462–482.) 8vo. *Vienna, 1862*
General research on the "flow" of the electric current.
—See also 1234.
1550. **Minotto**, Giovanni. Descrizione della nuova pila Daniell. 8 pp. 8vo. *Turin, 1862*
Description of the author's modification of Daniell's cell.
—See also 1600.
1551. **Nystroem**, C(arl) A(lfred). Rechen-Aufgaben aus der Electricitaets-Lehre besonders fuer Telegraphen-Beamte. 52 pp. 1 plate. 8vo. *Berlin, 1862*
Problems in electricity with solutions: written for use of persons in charge of telegraph stations.
—See also 5435.

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1552. **Pfeiffer**, C(lemens). Der elektrische Telegraph, eine gemeinschaftliche Belehrung ueber das Wesen, die Einrichtung und die verschiedenen Arten der elektrischen Telegraphen, sowie die Erregung, Fortleitung und Geschwindigkeit des elektrischen Stromes. viii+142 pp. 4 plates. 8vo. *Leipzig, 1862*
Brief description of various telegraphs.
—See also 1618.
1553. **Reitlinger**, Edmund. (1830?–1882.) Ueber die Artunterschiede der positiven und negativen Elektricitaet. 42 pp. 12mo. *Vienna, 1862*
Considerations on the two kinds of electricity.
- 1554.—Ueber Toene und einige Bewegungserscheinungen im Schliessungsbogen des galvanischen Stromes. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl. Vol. 45, pp. 453–482.) 8vo. *Vienna, 1862*
Sounds heard on opening an electric circuit.
—See also 1464.
1555. **Sabine**, (Sir) Edward. (1788–1883.) On the cosmical features of terrestrial magnetism, being the Reade lecture, delivered in the Senate House of the University of Cambridge, May 1862. 24 pp. ill. 8vo. *London, 1862*
Periodical laws in the mean effects of the larger magnetic disturbances.
—See also 945.
1556. **Schumann**, J. Eine neue Tangentenboussole. 32 pp. 4to. (Programm.) *Konigsberg, 1862*
Mathematical theory of the tangent galvanometer.
1557. **Stricker**, Wilhelm (Friedrich Karl). (1816–1891.) Samuel Thomas von Soemmering, der Heilkunde Doktor, nach seinem Leben und Wirken geschildert. vi+23 pp. portr. 4to. (Neujahrsblatt.) *Frankfort, 1862*
Life and work of Soemmering with sketch of his telegraph, as exhibited in August, 1869.
1558. **Thalén**, T(obias) R(ober) t. (1827–1905.) Recherches sur les propriétés magnétiques du fer. 43 pp. 4to. *Upsala, 1862*
Mathematical and physical paper on magnetic induction in various kinds of iron.
—See also 2051.
1559. **Oven**, Adolf van. De galvanische gasbatterij. 172 pp. 8vo. *Leyden, 1862*
Electrolysis and Grove's "gas" battery.
1560. **Volpicelli**, P(aolo). (1804–1879) Sulla polarità elettrostatica. V. comunicazione con appendice istorico-critica. (Atti Accad. Nuovi Lincei, Vol. 15, pp. 46–67.) 4to. *Rome, 1862*
Inquiry into the polarity of electrostatic machines.
—See also 1399.

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1561. Walker, William, Jr. Memoirs of the distinguished men of science of Great Britain living in the years 1807-1808; with an introduction by Robert Hunt. xii+228 pp. 1 plate. 8vo. *London, 1862*
Biographical sketch of fifty-one scientific men.
1562. Webb, F(rederick) C(harles). (1828-1899.) Treatise on the principles of electrical accumulation and conduction. Part I. (No more published.) vi+156+32 pp. ill. 12mo. *London, 1862*
Inquiry into changes due to electrostatic induction; illustrations are given of cases of electric charges induced under varying conditions.
—See also 3110.
1563. Weber, Wilhelm (Eduard). (1804-1891.) Zur Galvanometrie. (Abh. Ges. Wiss., Goettingen, Math.-Nat. Kl. Vol. 10, pp. 3-96.) 1 plate. 4to. *Gottingen, 1862*
Determination of the constants of a galvanometer.
—See also 1110.
1564. Wheatstone, (Sir) (Charles) (1802-1875) and (Sir) F(rederick) A(ugustus) Abel. (1827-1902.) Rapport au secrétaire d'état de la guerre sur les résultats des recherches entreprises à Woolwich et à Chatham sur l'application de l'électricité de différentes sources, à l'explosion de la poudre. Traduit de l'anglais par F. J. A. Martinet. 85 pp. 1 plate. 8vo. *Paris, 1862*
The induction coil and magneto machines as used for firing mines; Abel's fuse, illustrated.
—See also 2183, 2308.
1565. "Omega." New magnetic theory. 14 pp. 12mo. *Tunbridge, 1862*
"Attraction is the consequence of the conjunction of two or more magnetic atmospheres and their total or partial amalgamation," p. 13.
1566. Clark, (Josiah) Latimer. (1822-1898.) Letter by Josiah Latimer Clark to Sir William Thomson (Lord Kelvin) on retardative and inductive effects on long telegraph lines. (MS.) *June 5, 1863*
Effect of electrostatic induction on the rate of transmission of signals through cables.
—See also 1509.
1567. Culley, R(ichard) S(pelman). Handbook of practical telegraphy. viii+191+8+12 pp. ill. 8vo. *London, 1863*
Standard work on the theory and practice of telegraphy. (See No. 5050.)
- 1567a.—Second edition, considerably enlarged. ix+296 pp. ill. pl. 8vo. *London, 1867*
- 1567b.—Third edition, revised and enlarged. ix+317 pp. ill. pl. 8vo. *London, 1868*
- 1567c.—Fourth edition, revised and enlarged. vi+330 pp. ill. pl. 8vo. *London, 1870*
- 1567d.—Fifth edition, revised and enlarged. xvi+408 pp. ill. pl. 8vo. *London, 1871*

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- 1567e.—Sixth edition, revised and enlarged. xvi+443 pp. ill. pl. 8vo. *London, 1874*
—See also 1937, 3390.
1568. Dircks, Henry. (1806-1873.) Contribution towards a history of electro-metallurgy establishing the origin of the art. xvi+102 pp. portr. 12mo. *London, 1863*
The author contends that C. J. Jordan is the inventor of the art of electro-metallurgy.
—See also 1513.
1569. Fitzroy, (Robert). (1805-1865.) Arrangements for meteorologic telegraphy. Second edition. 32 pp. 8vo. *London, 1863*
Method of transmitting telegraphically the readings of the usual meteorological instruments.
- 1570.—Weather-book, a manual of practical meteorology. Second edition. xvi+480 pp. 16 plates. 8vo. *London, 1863*
Atmospheric electricity and magnetic phenomena are frequently referred to in this weather-book.
—See also 3288.
1571. Gherardi, S(ilvestro). (1802-1879.) Sul magnetismo polare de mattoni e d'altre terre cotte. Continuazione e propugnazione della memoria: Sul magnetismo polare di palazzi e di altri edifizj etc. (Extract, Mem. Accad. Sc. Bologna, Vol. 3.) 23 pp. 4to. *Bologna, 1863*
This paper treats of the magnetism observed in *bricks* and *terra cotta*; contains references to early writers. Boyle is omitted.
—See also 894.
1572. Klein, F. H. The foretelling of the weather in connexion with meteorological observations. Together with a description of the telegraphic warning system introduced into the Netherlands, June 1860, as proposed by Dr. Buys-Ballot. Translated from the original Dutch by A. Adriani. 31 pp. 8vo. *London, 1863*
Fitzroy's rules are given and discussed; but the author prefers to infer the state of the weather from what he calls the "deviation" rather than the normal barometric reading.
1573. Latini, Brunetto. (1230-1294.) Le livre dou trésor, publié pour la première fois d'après les manuscrits de la Bibliothèque Impériale, de la Bibliothèque de l'Arsenal, et plusieurs manuscrits des départements et de l'étranger par P. Chabaille. xxxvi+735 pp. 4to. (Collection de documents inédits sur l'histoire de France.) *Paris, 1863*
This famous work of the Italian statesman and philosopher (Dante's tutor), contains on p. 147 one of the earliest references to the mariner's compass.
1574. Marcoartu, Arturo de. Lignes sous-marines télégraphiques d'Europe aux Amériques de l'Atlantique au Pacifique. 56 pp. 1 map. 8vo. *Paris, 1863*
Description of existing lines and projected telegraph routes.

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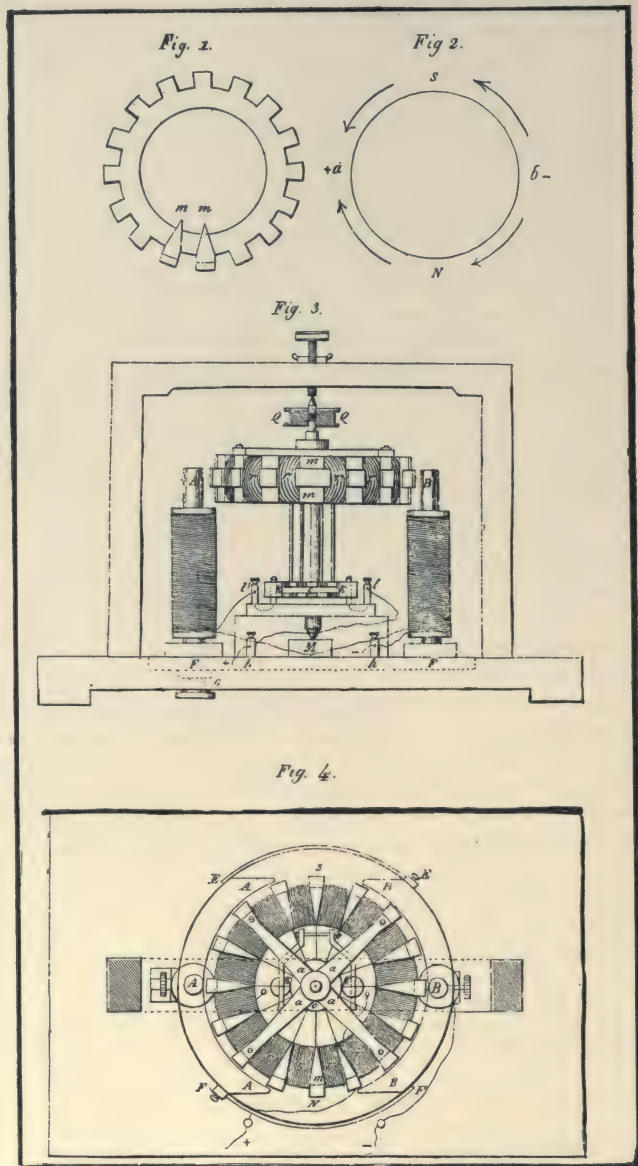
- 1574a.—(English translation.) Telegraphic submarine lines between Europe and America and the Atlantic and Pacific. 53 pp. 8vo. *New York, 1863*
1575. Masson, A(ntoine) Phillibert (1806-1860) & (Louis François Clément) Breguet. (1804-1883.) *Mémoire sur l'induction.* (Mém. présenté à l'Acad. des. Sc. 1841.) 22 pp. 1 plate. 8vo. *Paris, 1863*
Experiments on the *extra current*; conversion of dynamic into static electricity and vice versa.
—See also 941, 1154.
1576. Neckam, Alexander. (1157-1217.) *De naturis rerum libri duo*; with the poem of the same author, *De laudibus divinae sapientiae*. Edited by Thomas Wright. lxxviii+521 pp. L. 8vo. *London, 1863*
This famous work of the mediaeval monk and scholar treats of animate and inanimate nature as known in the 12th century. A remarkable reference to the compass will be found on p. 183; see also xxxiv. The volume contains a biographical and critical preface of 78 pages by Thomas Wright, the eminent English antiquary.
1577. Noble, W(illiam) H(enry). Report on ballistic experiments. vi+129 pp. pl. 8vo. *London, 1863*
Details of various electric methods for measuring the velocity of projectiles.
- 1577a.—Second report (on the same subject). vi+284 pp. pl. 8vo. *London, 1865*
Results of experiments made with various classes of projectiles using electroballistic apparatus.
—See also 1617.
1578. Parran. Note sur la lampe électrique de MM. Dumas et Benoit, et sur son application au tirage des coups de mines. (Ann. Mines. Vol. 4, pp. 455-472.) 8vo. *Paris, 1863*
Vacuum tubes as a source of light in mines.
1579. Piggott, W(illiam) P(eter). On the importance of ocean telegraphy: the impediments to its success, and the way to obviate them. 16 pp. 12mo. *London, 1863*
1580. Preece, (Sir) (William Henry). Railway telegraphs and the application of electricity to the signaling and working of trains. With an abstract of the discussion upon the paper by Charles Manby and James Forrest. 75+11 pp. 8vo. *London, 1863*
Details of the system of signaling used on the London and South-Western Railway.
—See also 1496.
1581. Raoult, François (Marie). (1830-1901.) *Étude des forces électromotrices des éléments voltaïques. Propositions de chimie.* 100 pp. 2 plates. 4to. (Thèse.) *Paris, 1863*
Study of the e. m. f. of a Daniell's cell, taking account of all the variables.
—See also 3359.

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Electromagnetic induction, eddy currents; Arago's "rotations;" Fizeau adds condenser to the Ruhmkorff coil.
—See also 1464.
1583. **Soemmering**, (Dettmar) W(ilhelm). (1793-1871.) Der elektrische Telegraph als deutsche Erfindung Samuel Thomas von Soemmering's aus dessen Tagebuechern nachgewiesen. 23 pp. 8vo. *Frankfort, 1863*
Notes from Soemmering's diary relating to his discovery of electric telegraphy.
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Notes of lectures given at the Royal Institution; qualities of a cable; theory of signaling.
—See also 1085.
1585. **Timbs**, John. (1801-1875.) Stories of inventors and discoverers in science and the useful arts. Second edition. vii+344 pp. ill. pl. 12mo. *London, 1863*
A popular history of scientific discoveries and inventions.
—See also 1734.
1586. **Tyndall**, John. (1820-1893.) Electricity at rest and electricity in motion. (Six lectures.) 23 pp. 8vo. *London, 1863-1864*
Notes of a juvenile course of lectures delivered at the Royal Institution.
—See also 1609, 1629, 1735, 1785, 2009, 2182, 2950.
1587. **Volpicelli**, Paolo. (1804-1879.) Sulla elettrostatica induzione. Ottava comunicazione. (Atti Accad. Nuovi Lincei, Vol. 16, pp. 484-498+643-666+874-876+1092-1093.) 4to. *Rome, 1863*
Defense of the author's views on electrostatic induction.
—See also 1399.
1588. **Weber**, Heinrich. Ueber die Bestimmung des galvanischen Widerstandes der Metalldraechte aus ihrer Erwaermung durch den galvanischen Strom nach absolutem Maasse. 33 pp. 2 plates. 4to. (Inaugural dissertation.) *Leipzig, 1863*
Change in the electric resistance of wires due to the thermal effect of the current.
—See also 2304.
1589. **Althaus**, Julius. On paralysis, neuralgia and other affections of the nervous system and their successful treatment by galvanisation and faradisation. Third edition. viii+236 pp. 12mo. *London, 1864*
Special therapeutical applications of continuous and of induced currents.
—See also 1852, 1963.
1590. **Buckmaster**, J(ohn) C(harles). Elements of experimental physics, acoustics, light and heat, magnetism and electricity. vi+202 pp. ill. 12mo. *London, 1864*
—See also 1899.

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The various systems of electric telegraphy briefly described.
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The conclusion reached after a discussion of 179 pages is that the mechanism of electric and magnetic phenomena is completely unknown.
1593. **Dowling**, Charles Hutton. Series of metric tables, in which the British standard measures and weights are compared with those of the metric system at present in use on the continent. xxxiv+124 pp. 8vo. *London, 1864*
Tables for facilitating the conversion of British weights and measures to the metric system and vice versâ.
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Descriptive hand-book of electric telegraphy.
—See also 1223.
1595. **Gherardi**, Silvestro. (1802-1879.) Lettera sopra un singolare esperimento del magnetismo delle terre cotte. (Rend. Accad. Sc. Bologna, 1864, pp. 71-75.) 8vo. *Bologna, 1864*
Note on the magnetic qualities of a specimen of terra-cotta.
—See also 894.
1596. **Huart**, (E.) (also Colnet d'Huart). Nouvelle théorie mathématique de la chaleur et de l'électricité. (Soc. Sc. Nat. Grand-Duché de Luxembourg, Vol. 7, pp. i-vii+1-190.) 3 plates. 8vo. *Luxemburg, 1864*
Mathematical treatise on heat and electricity, embodying the author's own views.
1597. **Le Boulengé**, P(aul Émile). Mémoire sur une chronographe électro-balistique. (Mém. Sav. Etrang. Acad. Sc., Belgique, Vol. 32, pp. 1-29.) 4to. *Brussels, 1864*
Illustrated description of the author's chronograph for ballistic determinations.
—See also 1682.
1598. **Lindig**, Franz. Quomodo mutantur vires electricae cum temperatura. 35 pp. 8vo. (Inaugural dissertation.) *Berlin, 1864*
Effect of temperature on the e. m. f. of a cell.



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Popular exposition of some of the effects of the electric current.
—See also 985.
1600. **Minotto, Giovanni.** Pile à Sable. (Daniell-Minotto.) Expériences et comparaisons avec les autres piles et informations sur les applications. 4 pp. 4to. *Turin, 1864*
Experimental data concerning the internal resistance and current strength of the Minotto cell.
—See also 1550.
1601. **Pacinotti, Antonio.** (Born 1841.) Descrizione di una macchinetta elettro-magnetica (costrutta nel 1860). (Nuovo Cimento, Vol. 19, pp. 378-384.) 1 plate. 8vo. *Pisa, 1864*
Paper of historic interest containing a description of the author's *ring-armature with closed coils*. Though invented in 1860, this machine was first described by Pacinotti in *Nuovo Cimento*, 1864. The investigations and discoveries of Dr. Pacinotti entitle him to a distinguished place among the pioneers of electrical science.
- 1601[†]a.—Electro-Magnetic machine. Translated from the *Il Nuovo Cimento*, June, 1864. (Proof-copy.) 8 pp., 4 ill. 8vo. *(No date.)*
—See also 1948, 2444, 3735.
1602. **Parson, George.** Elementary magnetism, and the local attraction of ships' compasses adapted for the use of navigators; with a table of the true azimuth of the mean place of the north pole star. 40 pp. 1 table. 12mo. *Sunderland, (1864)*
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Electro-medical work pointing out the effects to be expected from the application of the electric current, both direct and alternating, in the treatment of nervous troubles.
—See also 1999, 3201.
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Description and mathematical theory of the horizontal dynamometer.

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Electric effects due to the contact of different mineral waters.
—See also 1372, 5559.
1608. **Thompson**, J. Baynes. Mechanical theory of electric induction and its application. 14 pp. 8vo. *London, 1864*
1609. **Tyndall**, John. (1820-1893.) On a magnetic experiment. 7 pp. 8vo. *(London,) 1864*
Notes of a lecture on the lengthening of a bar during magnetization.
—See also 1586.
1610. **Boltzmann**, Ludwig. (1844-1906.) Ueber die Bewegung der Elektrizität in krummen Flächen. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., Vol. 52, pp. 214-221.) 8vo. *Vienna, 1865*
Electrical stream-lines on curved surfaces.
1611. (**Coignet**, François.) Note sur les bétons agglomérés à base de chaux système Coignet. 48 pp. 8vo. *Paris, 1865*
Concrete and its uses.
1612. **Ebner**, Moritz, von. Ueber Telegraphie in ihrem Zusammenhange mit dem Entwicklungsgange der Naturwissenschaften, I.; und in ihrer Anwendung auf die Zwecke des Krieges, II. (Mitt. K. K. Génie Comité, Vol. 10, pp. 337-377.) 8vo. *Vienna, (?) 1865*
General considerations on the transmission of energy.
—See also 1352.
1613. **Hankel**, W(ilhelm) Gottlieb. (1814-1899.) Ueber die Durchbohrung des Stanniols durch den Entladungsschlag der elektrischen Batterie. (Sitz. Ber. Saechs. Ges. Wiss. Math.-Nat. Kl., Vol. 17, pp. 94-116.) 8vo. *Leipzig, 1865*
Some effects due to the discharge of Leyden batteries.
—See also 1524.
1614. **Hooper**, William. India-rubber considered in reference to its applicability as an insulator for telegraphic conductors. 12 pp. L. 8vo. *(London,) 1865*
—See also 1645, 3546.
1616. **Martin**, Th(omas) Henri. (1813-1884.) Observations et théories des anciens sur les attractions et les répulsions magnétiques et sur les attractions électriques. 42 pp. 4to. *Rome, 1865*
Early history of magnetism and electricity with copious references; work of erudition.
—See also 1650.
1617. **Noble**, W(illiam) H(enry). Description of Navez-Leur's electro-ballistic chronoscope for determining the velocity of projectiles. (Rev. Techn. Milit., Vol 4, pp. 245-279.) 8vo. *Paris, 1865*
General history of ballistic experiments with description of methods and apparatus used by various investigators.
—See also 1577.

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1618. **Pfeiffer**, Clemens. Handbuch der elektro-magnetischen Telegraphie nach Morse'schem System. xii+282 pp. 12mo. (Neuer Schauplatz der Kuenste und Handwerke, Vol. 272.) *Weimar, 1865*
 Elementary manual of the electric telegraph.
 —See also 1552.
1619. **Preece**, (Sir) William Henry. On railway electric signalling. 39 pp. ill. 1 plate. 8vo. *London, 1865*
 Electricity "supplies the only means that science possesses to enable us to carry out the block system in its entirety."
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 Generalities about submarine cables and ocean-depths; preference given to the "hempen" cable.
 —See also 1428.
1622. **Russell**, (Sir) W(illiam) H(enry). Atlantic telegraph; illustrated by Robert Dudley. v+117 pp. 28 plates. 4to. *London, (1865)*
 The illustrations are of much interest.
1623. **Schoedler**, Friedrich. (1813-1884.) Treasury of science, natural and physical. Translated and edited by Henry Medlock. xii+617 pp. ill. 8vo. *London, 1865*
 Short chapter on the elementary parts of electricity and magnetism.
1624. **Seguin**, (Marc) (Senior). (1786-1875.) Mémoire sur les causes et sur les effets de la chaleur et de la lumière et de l'électricité. 113 pp. L. 8vo. *Paris, 1865*
 The ether of space is held to be an unnecessary assumption.
 —See also 3143.
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 The electric telegraph and its relation to law.
1626. **Seward**, William H(enry). (1801-1872.) Der Telegraph um die Erde, zur Verbindung der oestlichen und westlichen Halbkugel in der Richtung ueber Moskau, dem Armur, die Behringstrasse, British Columbia und Californien. Aus dem Englischen uebersetzt von Cl. Gerke. 60 pp. 1 map. 8vo. *Hamburg, 1865*
 Plan for telegraphic communication all around the globe.
1627. **Stefan**, J(oseph). (1835-1893.) Ueber einige Thermoelemente von grosser elektromotorischer Kraft. (Sitz. Ber. Akad. Wiss. Math.-Nat., Kl. Vol. 51, pp. 260-262.) 8vo. *Vienna, 1865*
 Note on various thermo-electric combinations for the production of strong currents.

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- 1627a.—(English translation.) On some thermo-elements of great electromotive force. (*Philos. Mag., Ser. IV, Vol. 30, pp. 77-78.*) 8vo. *London, 1865*
1628. Thomsen, (Hans Peter Jorgen) J(ulius). *Polarisations-Batterie.* (Extract, *Zeitschr. Physikal. Chemie, Vol. 3.*) 32 pp. ill. 8vo. *Hamburg, 1865*
Description of the secondary battery devised by the author.
—See also 3210.
1629. Tyndall, John. (1820-1893.) *Heat considered as a mode of motion, being a course of twelve lectures delivered at the Royal Institution of Great Britain in 1862.* Second edition, with additions and illustrations. xx+532 pp. ill. 12mo. *London, 1865*
This edition embodies the author's researches on radiant heat.
—See also 1586.
1630. Kerkwijk, J. J. van. *Beschrijving van eenige verschijnselen, die zich voordoen in de telegraafdraden, door invloed van atmosferische elektriciteien van het norderlicht.* (*Verh. Instit. Ingen., 1864-1865.*) 36 pp. 1 plate. 8vo *The Hague, 1865*
Telegraph disturbances caused by atmospheric electricity and by polar aurorae.
—See also 3652.
1631. Wenckebach, W(ilhelm). (1803-1847.) *Sur Petrus Adsigerius et les plus anciennes observations de la déclinaison de l'aiguille aimantée traduit du Hollandais par T. Hooiberg.* (*Ann. Matematica, Vol. 7, pp. 159-168.*) 4to. *Milan, 1865*
The author concludes that the reference to magnetic declination in the Leyden MS. of the letter of *Petrus Peregrinus* (1269) (see No. 46), is an interpolation made in the early part of the XVI. century.
1632. Zetzsche, Karl Eduard. (1830-1894.) *Die Copirtelegraphen, die Typendrucktelegraphen und die Doppeltelegraphie. Ein Beitrag zur Geschichte der elektrischen Telegraphie.* vi+198 pp. ill. 8vo. *Leipzig, 1865*
Various writing and printing-telegraphs.
—See also 1961, 2058, 2119, 2219, 3899.
1633. *The Atlantic telegraph; its history from the commencement of the undertaking in 1854, to the return of the Great Eastern, in 1865.* 117 pp. pl. & maps. 12mo. *London, 1865*
The book contains photographs of Cyrus W. Field and Prof. Thomson, (Lord Kelvin).
1634. *Notice sur les travaux de (Jean Bernard) Léon Foucault.* 37 pp. 4to. *Paris, 1865*
Sketch of the scientific work of Foucault (1819-1868), including his *pendulum* demonstration of the rotation of the earth made in the year 1851.
1635. Adley, (Charles) C(oles). *The story of the telegraph in India.* viii+86 pp. 1 map. 8vo. *London, 1866*
Criticism of the instruments and methods used on the Indian telegraph lines; also plea for the emancipation of telegraphs from Government control.
—See also 1274.

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Electric manifestation is due to heat, friction and chemical action.
—See also 3382.
1637. **Benet, S(tephen) V(incent).** Electro-ballistic machines and the Schultz's chronoscope. 47 pp. 4 plates. 4to. *New York, 1866*
Brief historical review with full details of the chronoscope.
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The discussion to which this lecture gave rise elicited information on the durability of insulating materials, on the manufacture and failure of cables and other related subjects.
—See also 1510, 4427.
1640. **Field, Henry M(artyn).** (1822-1907.) History of the Atlantic telegraph from the beginning 1854, to the completion August, 1866. 364 pp. ill. 8vo. *London, 1866*
Story of the great cable enterprise popularly told.
1641. **Gassiot, J(ohn) P(eter).** (1797-1877.) Stratified discharges in vacuum tubes. (Intellectual Observer, 1866, pp. 82-84.) 1 plate. 8vo. *London, 1866*
- 1642.—**Electrical researches with vacuum tubes.** (Intellectual Observer, 1866, pp. 289-290.) 1 plate. 8vo. *London, 1866*
Some of these experiments were made with a water-battery of 4000 small cells.
—See also 1455.
1643. **Gérard, (Antoine J.)** Le magnétisme à la recherche d'une position sociale, sa théorie, sa critique, sa pratique. 233 pp. portr. 12mo. *Paris, 1866*
Electro-medical work, Mesmer justified.
—See also 5424.
1644. **Grover, J(ohn) W(illiam).** Estimates and diagrams of railway bridges for turnpike, public and occupation roads in the embankments of double or single lines, and cuttings of double lines; also culverts of various dimensions. 34 plates. Folio. *London, 1866*
1645. **Hooper, William.** On the electrical and mechanical properties of Mr. Hooper's India rubber insulated wire for telegraphic cables. 13 pp. 10 plates. diagrs. 4to. *London, 1866*
Paper read at the Nottingham meeting of the British Association, 1866.
—See also 1614.
1646. **Hopkins, Evan.** (? -1867.) Invention for an improved mode of correcting the deviation of compasses in iron ships, and

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- of constructing ships' compasses and binnacles, so as to prevent deviation. 8 pp. 1 plate. 8vo. *London, 1866*
 Method of depolarizing the hull of iron ships in order to eliminate its influence on the compasses.
 —See also 1061.
1647. **Kuehn, Karl.** (1816–1869.) *Handbuch der angewandten Electricitätslehre mit besonderer Berücksichtigung der theoretischen Grundlagen.* 2 vols. xx+1396 pp. ill. tabl. 8vo. (Allgemeine Encyclopædie der Physik, Vol. 20, parts 1 & 2.) *Leipzig, 1866*
 These two volumes form part of an encyclopædia of physics; they deal with lightning-conductors, electricity in mines and telegraphy; also *bibliography* of the subjects treated.
 —See also 1763.
1648. **Larkins, Walter F.** *The commercial code of signals for the use of all nations.* xxiv+246 pp. pl. 4to. *London, 1866*
 Signaling at sea by means of flags.
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 The commercial features of submarine telegraphy.
1650. **Martin, Th(omas) Henri.** (1813–1884.) *La foudre, l'électricité et le magnétisme chez les anciens.* v+418 pp. 12mo. *Paris, 1866*
 Knowledge of the ancients on the magnet, electric attraction, thunder, lightning, the aurora borealis, the mariner's compass.
 —See also 1616.
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 The author puts forward his claim to the invention of the induction coil.
 —See also 1689, 2729.
1652. **Preece, (Sir) William Henry.** *Electrical inter-communication in trains in motion.* 23 pp. pl. 16mo. *London, 1866*
 —See also 1496.
1653. **Sestier, F(élix).** *De la foudre, de ses formes et ses effets sur l'homme, les animaux, les végétaux et les corps bruts, des moyens de s'en préserver et des paratonnerres; rédigé sur les documents laissés par M. Sestier et complété par M. C. Méhu.* 2 Vols. 8vo. *Paris, 1866*
 Treats extensively of the effects of lightning, death by lightning, and also the history and construction of lightning-conductors.
1654. **Siemens, (Sir) Charles William.** (1822–1883.) *Die elektrische Telegraphie.* 40 pp. 8vo. (Sammlung gemeinverständlicher wissenschaftlicher Vorträge, Heft 22.) *Berlin, 1866*
 Historical sketch of the electric telegraph.
 —See also 1502, 1655, 2107, 2177, 2258, 2378, 3107.

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1655. Siemens, (Ernst) W(erner) (1816-1892.) & (Sir) Charles William Siemens. (1822-1883.) *Methode fuer fortlaufende Beobachtungen der Meerestemperatur bei Tiefenmessungen.* (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., 1866, pp. 416-418.) 8vo. *Berlin, 1866*
Determination of deep-sea temperature by the bridge method.
—See also 1214, 1654.
1656. Thomson, (Sir) William. (Lord Kelvin.) (1824-1907.) *Atlantic telegraph cable, address delivered before the Royal Society of Edinburgh.* With other documents. 31 pp. ill. 8vo. *London, 1866*
Velocity of settling, angle of immersion, method of grappling for submarine cables.
- 1656a.—(The same paper.) 12 pp. 8vo. *London, 1866*
The forces concerned in laying and lifting a deep-sea cable.
—See also 1085.
1657. Walker, Edward. (? -1893.) *Terrestrial and cosmical magnetism.* The Adams prize essay for 1865. iv+336+vi pp. 10 plates. 8vo. *Cambridge, 1866*
The essay contains a brief history and development of magnetic research connected with terrestrial magnetism. The volume contains numerous magnetic charts of each of the three elements and their variations.
—See also 3712.
1658. Airy, (Sir) George Biddell. (1801-1892.) *Account of experiments in iron-built ships.* (Extract, Philos. Trans. Roy. Soc. 1839.) 44 pp. 8vo. (The magnetism of ships and the deviations of the compass. Papers edited by B. Franklin Greene. No. 2.) *Washington, 1867*
- 1659.—On the correction of the compass in iron-built ships. (Extract, Colburn's United Service Journ. June, 1840.) 5 pp. 8vo. (The magnetism of ships and the deviations of the compass. Papers edited by B. Franklin Greene. No. 3.) *Washington, 1867*
- 1660.—On the observed deviations of the compass in wood-built and iron-built ships. (Extract, Philos. Trans. Roy. Soc. 1856.) 53 pp. 8vo. (The magnetism of ships and the deviations of the compass. Papers edited by B. Franklin Greene. No. 4.) *Washington, 1867*
- 1661.—On the building of iron ships and the correction of their compasses. (Extract, Trans. Instit. Naval Archit. Vol. 1, 1860.) 6 pp. 8vo. (The magnetism of ships and the deviation of the compass. Papers edited by B. Franklin Greene. No. 6.) *Washington, 1867*
- 1662.—Experiments on the comparative susceptibility to magnetism of hot-rolled and cold-rolled iron. (Extract, Trans. Instit. Naval Archit. Vol. 3, 1862.) 2 pp. (The magnetism of ships and the deviations of the compass. Papers edited by B. Franklin Greene. No. 10.) *Washington, 1867*

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- 1663.—On the difference in the magnetic properties of hot-rolled and cold-rolled malleable iron, as regards the power of receiving and retaining induced magnetism of sub-permanent character. (Extract, Philos. Trans. Roy. Soc. 1862.) 16 pp. 8vo. (The magnetism of ships and the deviations of the compass. Papers edited by B. Franklin Greene, No. 14.)
Washington, 1867
- See also 1376.
1664. **Arnoux, E(rnest).** Lettre électrique; nouveau service télégraphique rendu populaire: I. par l'extension donnée aux dépêches; II. par l'abaissement des tarifs; III. par des moyens nouveaux permettant l'augmentation des transmissions. xix+106 pp. 7 plates. 8vo.
Paris, 1867
 The object of the work is to popularize the electric telegraph by securing secrecy for the dispatches and by reducing the tariff.
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eries; I must now say that the action of magnetism and electricity on light was the most brilliant," p. 240.

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The author also wrote a work on the "earth-current and its connection with the magnetism of the earth," 1862.
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This second memoir contains the text of the famous "*Epistola*" of *Petrus Peregrinus*, (See No. 46), on the magnet together with the readings of various codices, critical notes and historical references.
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Exposition of the elements of algebra, geometry, mechanics and electricity necessary to understand the theory and applications of electric telegraphy.
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Handbook valuable both to student and practical telegraphist.
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Short paper on the resistance of liquids; also Nippoldt's determination of the resistance of phosphoric acid.
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Short paper on electrodynamic theory.
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Explanation and use of the various signals in use in the army.
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Construction and working of the electric military telegraph.
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The military telegraph in France and abroad: equipment and *personnel*.
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The author gives the text of two manuscript papers of Galvani on the torpedo together with his remarks on same.
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Discussion of Romagnosi's observation (1802), of the action of an electrode from a battery on a compass-needle. The Italian text is accompanied by a manuscript translation. (See No. 974.)
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Chapter on the military electric telegraph.
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Popular exposition of the properties and applications of the electric spark and the electric current.
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—See also 1687.
1750. **Palmieri, Luigi.** (1807–1896.) Description du seismographe électro-magnétique, appareil enregistreur des tremblements de terre et de l'appareil à conducteur mobile avec l'électromètre bifilaire pour les observations comparables de l'électricité atmosphérique. Traduction française de A. Mauche. 16 pp. 2 plates. 4to. *Naples, 1869*
The seismograph of the observatory of Mount Vesuvius which was devised by the author.
—See also 1079.
1751. **Pepper, J(ohn) H(enry).** (1821–1900.) Cyclopaedic science simplified; embracing light, heat, electricity, magnetism, pneumatics, acoustics, chemistry. xiii+685 pp. ill. Sq. 16mo. *London, (1869)*
A well-known popular manual of the elements of experimental science. (See No. 1828.)
—See also 1528.
1752. **Poggendorff, (Johann Christian).** (1796–1877.) Ueber das Holtz'sche Rotationsphaenomen. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., 1869, pp. 754–785.) 8vo. *Berlin, 1869*
Phenomenon observed while using a Holtz machine.
—See also 1027.
1753. **Pope, Franklin L(eonard).** (1840–1895.) Modern practice of the electric telegraph. 128 pp. ill. pl. 8vo. *New York, 1869*
- 1753a.—Tenth edition. 160 pp. ill. 3 plates. 8vo. *New York, 1877*
Handbook specially designed to meet the wants of the telegraph operator.
—See also 2163, 2433, 2444, 5110.
1754. **Sauer, George.** The telegraph in Europe. A complete statement of the rise and progress of telegraphy in Europe, show-

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ing the cost of construction and working expenses of telegraphic communications in the principal countries, etc. Corrected from Official Returns. 177 pp. tab. 8vo. *Paris, 1869*
The introduction gives a sketch of the rise and progress of telegraphy; the rest of the work treats of general telegraphic statistics in the various countries of Europe.

1755. **Stockalper, de.** Les avantages du Simplon sous le rapport de la construction et de l'exploitation d'un chemin de fer. 72 pp. 5 plates. 4to. *Lausanne, 1869*

Reasons for recommending the Simplon route.

1756. **Ternant, A. L.** Manuel pratique de télégraphie sous-marine, construction, pose, entretien et exploitation de câbles sous-marins, épreuves électriques qu'ils subissent etc. xi+226 pp. 2 plates. 12mo. *Paris, (1869)*

Construction and laying of a submarine cable. An appendix gives data of cables laid.

—See also 1888, 2007, 2375, 3799.

1757. **Waltenhofen, A(dalbert Carl) von.** Ueber die Grenzen der Magnetisirbarkeit des Eisens und des Stahles. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., Vol. 59, pp. 770-788.) 8vo. *Vienna, 1869*

According to the author "anomalous magnetizing" is the residual magnetism which he found in thick iron cores to be opposite in character to the temporary magnetism due to the magnetizing current.

—See also 1849, 3475.

1758. **Warren, Thomas T. P. Bruce.** On electrification. 11 pp. 8vo. *Croydon, 1869*

Note on the "electrification" of cables.

—See also 3591.

1759. **Electric disc and experiments.** By a positive conductor. viii+96 pp. ill. 12mo. *London, 1869*

A revolving glass-disc furnishes electricity for a number of popular experiments.

1760. **Liverpool, Compass Commission.** The magnetism of ships and the deviations of the compass comprising the three reports of the Liverpool Compass Commission, with additional papers by Archibald Smith and F(rederic) J(ohn) (Owen) Evans. xiii+344 pp. 49 plates. 8vo. (Reprinted.) *Washington, 1869*

The three reports of the Commission contain important information on the magnetism of iron ships and on methods of correcting resulting errors. These are followed by Scoresby's *Journal of the Royal Charter* with critical introduction by Archibald Smith. (See No. 1704.)

1761. **New magneto-electric machine.** (Student and Intellectual Observer, Vol. 2, pp. 444-447.) ill. 8vo. *London, 1869*

The machine was devised by Browning.

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1762. Poles, wires, and cables; or, Electric telegraphs: their past and their future, their commercial advantages. 60 pp. 8vo.
London, 1869
Early history of the electric telegraph; ocean telegraphy; government acquisition of telegraphs.
- 1762a.—Second edition. 60 pp. 8vo. *London, 1870*
1763. Kuehn, Karl. (1816-1869.) Die elektro-magnetische Materie in ihrer kosmischen Existenz. 18 pp. 12mo.
St. Johann a. d. Saar, (186?)
Electromagnetic paper on the sun, comets and Saturn's rings.
—See also 1647.
1764. Netoliczka, Eugen. (1825-1889.) Geschichte der Elektrizitaet bis zur Entdeckung des Galvanismus. 26 pp. 4to.
(Graz, 186?)
Succinct history of electrical discovery down to the time of Coulomb.
1765. Airy, (Sir) George Biddell. (1801-1892.) Treatise on magnetism, designed for the use of students in the University. xv+220 pp. ill. 8vo. *London, 1870*
Mathematical treatise with special reference to the effect of the magnetism of iron ships on their compasses.
—See also 1376.
1766. Baker, Thomas R. Researches in electricity. 28 pp. 8vo. (Inaugural dissertation.) *Gottingen, 1870*
Comparison of spark-length, density and quantity of electricity.
1767. De La Rive, A(uguste Arthur). (1801-1873.) Recherches sur la polarisation rotatoire magnétique des liquides. (Arch. Sc. Phys. Nat., Genève, Vol. 38, pp. 209-254.) 8vo. *Geneva, 1870*
Magnetic rotatory power of certain liquids.
—See also 818.
1768. Dropsy, Josef. Zasady ogolnego zastósowania elektryczności. 103+ii pp. 8vo. *Warsaw, 1870*
The use of electricity, especially the static form, for curative purposes.
1769. Du Bois-Reymond, (Emil Heinrich). (1818-1896.) Abhandlung ueber die periodische Bewegung gedaempfter Magnete. (Nachtrag.) (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., 1870, pp. 537-570.) 1 plate. 8vo. *Berlin, 1870*
Some points in the theory of magnetic damping.
—See also 1172.
1770. Edlund, E(rik). (1819-1888.) Recherches sur la force électromotrice dans le contact des métaux et sur la modification de cette force par la chaleur. (Mém. Acad. Sc., Stockholm, Vol. 9, No. 14.) 44 pp. 1 plate. 4to. *Stockholm, 1870*
Chemical affinity, the Peltier effect, and the e. m. f. of contact.
—See also 1906, 2025, 3500.
1771. Gordon, Margaret Maria. The home life of Sir David Brewster, by his daughter. Second edition. xi+482 pp. 8vo. *Edinburgh, 1870*
The authorship of the letter in the *Scots Magazine* (See No. 378), signed C. M., is attributed to Charles Morrison of Renfrew, p. 208.

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1772. **Harrison, Charles.** On the extraordinary powers of electricity as a curative for certain special ailments peculiar to man. 44 pp. 12mo. *London, 1870*
Historical sketch of electricity.
1773. **Hedouin, Paul.** L'électricité appliquée au sondage des mers. Les câbles électriques sous-marins. 81 pp. 6 plates. L. 8vo. *Paris, 1870*
Electrical apparatus for deep-sea sounding.
1774. **Holzmueller, (Ferdinand) Gustav.** Ueber die Anwendung der Jacobi-Hamilton'schen Methode auf den Fall der Anziehung nach dem elektrodynamischen Gesetze von Weber. 23 pp. 8vo. (Inaugural dissertation.) *Halle, 1870*
Mathematical dissertation on Weber's electrodynamic law of attraction.
1775. **Le Cordier, Paul.** Sur les aires sphériques de Gauss, sur la périodicité qui caractérise les potentiels des lignes fermées, et sur les surfaces des niveaux correspondantes. (Usage des potentiels dans l'électro-dynamique et dans l'électro-magnétisme. 91 pp. 1 plate. 4to. (Thèse.) *Paris, 1870*
Demonstration and application of Gauss's theorem.
1776. **Lemstroem, (Karl) S(elim).** (1838-1904.) Recherches expérimentales sur la marche d'intensité des courants d'induction voltaïque. (Handl. Svenska Vetensk. Akad., Vol. 8, pp. 1-186.) 4 plates. 4to. *Stockholm, 1870*
Currents at making and breaking in an induction coil.
1777. **Obermayer, (Joseph Vincenz) Albert von.** Experimentelle Bestimmung des Leitungswiderstandes in Platin-Bleichen. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., Vol. 60, pp. 245-260.) tab. 8vo. *Vienna, 1870*
Resistance and size of electrodes.
1778. **Parkinson, J. C.** The Ocean telegraph to India: A narrative and diary. xii+328 pp. portr. 8 plates. 8vo. *Edinburgh, 1870*
Narrative of the British-Indian telegraph expedition of 1869.
—See also 3525.
1779. **Peterin, Julius.** Ueber die Bildung elektrischer Ringfiguren durch den Strom der Influenzmaschine. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., Vol. 62, pp. 679-686.) 1 plate. 4to. *Vienna, 1870*
Electrical figures produced by discharges from a Holtz machine.
—See also 1442.
1780. **Phipson, T(homas) L(amb).** Phosphorescence; or, The emission of light by minerals, plants and animals. xv+210 pp. ill. 1 plate. 12mo. *London, 1870*
Observations on the emission of light by minerals and animals; the glow-worm, p. 135.
—See also 1124.
1781. **Poggendorff, (Johann Christian).** (1796-1877.) Ueber einige neue, merkwuerdige Eigenschaften der diametralen Conduc-

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toren an der Elektromaschine, und eine darauf gegruendete Doppelmaschine dieser Art. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., 1870, pp. 275-310.) 8vo. *Berlin, 1870*

Function of the diagonal conductor of a Holtz machine.

—See also 1027.

1782. Raynaud, Jules (François Emmanuel). (1843-1888.) Recherches expérimentales sur les lois d'Ohm et leurs applications aux essais électriques des câbles sous-marins. 120 pp. 2 plates. 4to. (Thèse.) *Paris, 1870*

Ohm's law and its application to the determination of faults in telegraph circuits.

—See also 4147.

1783. Riess, (Peter Theophil.) (1804-1883.) Ueber die Theorie der neuesten Elektrophormaschine und der ueberzaehligen Conductoren. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., 1870, pp. 1-13.) 8vo. *Berlin, 1870*

On the theory of the Holtz machine.

—See also 862.

1784. Rother, L. F. W. Der Telegraphenbau. Ein Handbuch zum praktischen Gebrauch fuer Telegraphen-Techniker und Beamte bearbeitet. Third edition. x+306 pp. 8vo. *Berlin, 1870*

Construction and operation of telegraphs and submarine cables.

1785. Tyndall, John. (1820-1893.) Notes of a course of seven lectures on electrical phenomena and theories, delivered at the Royal Institution of Great Britain. April-June, 1870. viii+40 pp. 12mo. *London, 1870*

A useful *résumé* of afternoon lectures given at the Royal Institution, April-June, 1870.

- 1786.—Researches on diamagnetism and magne-crystallic action, including the question of diamagnetic polarity. xix+361 pp. 6 plates. 8vo. *London, 1870*

Tyndall defends the view that bismuth acquires opposite polarity to that of iron when placed in a non-uniform magnetic field.

—See also 1586.

1787. Villefranche, J(acques) M(elchior). La télégraphie française; étude historique, descriptive, anecdotique et philosophique, avec figures, suivie d'un guide-tarif à l'usage des expéditeurs de télégrammes. viii+348 pp. ill. 12mo. *Paris, 1870*

Short history of telegraphy followed by technical and administrative matters.

1788. Volpicelli, P(aolo). (1804-1879.) Esposizione del modo col quale per la prima volta fu applicato il calcolo alla elettrostatica e ne fu concluso che la elettricità indotta non tende. Memoria per servire alla storia dell' elettricità. (Atti Accad. Nuovi Lincei, Vol. 23.) 51 pp. 4to. *Rome, 1870*

The charge of condensers with special reference to the formula given by Aepinus.

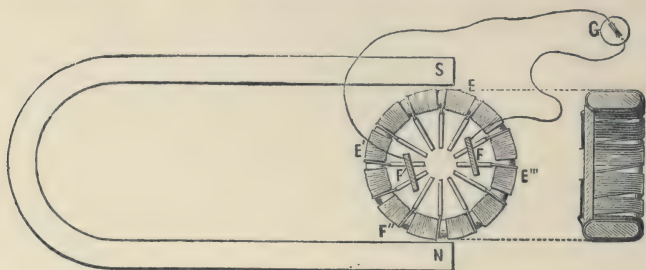
—See also 1399.

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1789. **The education** and status of civil engineers in the United Kingdom and in other foreign countries. xvii+213 pp. 8vo. (Institution of Civil Engineers Paper.) *London, 1870*
Courses of studies in engineering schools in Great Britain and abroad.
1790. **Arson, A(lexander).** Compensateur de la déviation du compas à bord des navires en fer. 61 pp. 10 plates. 8vo. *Paris, 1871*
Brief mathematical and practical treatment of the compensation of ships' compasses.
1791. **Ayrton, W(illiam) E(dward).** On a quantitative method of testing a telegraph earth. (Journ. Asiatic Soc., Bengal, Vol. 40, pp. 177-185.) 8vo. *Calcutta, 1871*
—See also 2043, 2060, 2127, 2419, 3858.
1792. **Bertelli, Timoteo.** (1826-1905.) Intorno a due Codici Vaticani della Epistola de magnete di Pietro Peregrino di Maricourt ed alle prime osservazioni della declinazione magnetica. (Si aggiunge una nota di B. Boncompagni intorno alle edizioni della detta epistola del Peregrino.) (Extract, Bull. Bibliogr. Storia Sc. Mat. Fis. Vol. IV, pp. 303-332.) 31 pp. 4to. *Rome, 1871*
Critical study of the two Vatican codices of the letter of *Peregrinus* (See No. 46), on the magnet; followed by a note on magnetic declination with copious references.
—See also 1441.
1793. **Braun, Karl.** (1831-1907.) Studi sopra gli strumenti magnetici. (Extract, Bull. Meteorol. Collegio Romano, Vol. 10.) 56 pp. 8vo. *Rome, 1871*
Determination of the magnetic dip and declination in the Collegio Romano.
1794. **De la Rive, A(uguste) A(rthur)** (1801-1873) & **E(douard) Sarasin.** (1843-1890.) De l'action du magnétisme sur les gaz traversés par des décharges électriques. (Arch. Sc. Phys. Nat., Genève, Vol. 41, pp. 5-26.) 8vo. *Geneva, 1871*
The action of a magnetic field on the electric discharge in rarefied gases.
—See also 818, 1827.
1795. (**Dioscorides, Dr.**) (pseud.) Anno Domini 2071; translated from the Dutch original with preface and additional explanatory notes by A. V. W. Bickers. x+132 pp. 12mo. *London, 1871*
Work of fancy and humor.
1796. **Du Moncel, Th(éodore) Achille Louis.** (1821-1884.) Recherches sur les meilleures conditions de construction des électro-aimants. xi+124 pp. 8vo. *Paris, 1871*
Mathematical investigation of the best way of winding electro-magnets for telegraph purposes.
- 1796a.—(English translation.) Elements of construction for electro-magnets. Translated by Ch. J. Wharton. xiii+86 pp. 12mo. *London, 1883*
—See also 1223.

nables, il est possible de réaliser un appareil fournissant des courants continus pendant une durée indéfinie.

» Supposons en effet que l'électro-aimant, au lieu de présenter la forme rectiligne de la *fig. 1*, prenne la forme circulaire $EE'E''E'''$ (*fig. 2*). Sou-



mettons-le à l'action simultanée des deux pôles N. et S. d'un aimant en fer à cheval N.-O.-S. Supposons l'anneau électro-aimant tournant autour de son centre d'un mouvement uniforme dans le sens indiqué par la flèche.

» Le pôle S. produira, dans la partie de l'anneau qui est dans son voisinage, un courant dont le sens pourra être déterminé soit au moyen de l'expérience directe, soit en se reportant à celle que nous avons rapportée sur l'électro-aimant droit. On comprend aisément que le pôle N. produira dans son voisinage un courant de sens contraire au précédent. Enfin il est aisé de se rendre compte que, dans les deux parties de l'anneau placées à angle droit, et qu'on peut appeler *moyennes*, il n'y a aucun courant produit. Si donc on veut recueillir les deux courants contraires produits simultanément dans le fil de l'anneau électro-aimant, il suffit d'établir deux frotteurs correspondants aux parties moyennes, qui sont comme les rhéophores de cette pile d'un nouveau genre.

» Il est opportun de donner quelques détails sur ces frotteurs, tels qu'ils ont été employés jusqu'ici et tels qu'ils sont dans la machine mise sous les yeux de l'Académie.

» Si le fil enroulé sur l'anneau est très-gros, si en outre on n'a placé qu'une seule rangée de tours de ce fil, comme il peut être utile de le faire pour certaines expériences, il suffit de dénuder le fil sur une ligne et d'établir des frotteurs pressant sur cette partie nue. Mais si l'on emploie du fil plus fin et si l'on met sur l'anneau un grand nombre de rangées de fil, on

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1797. **Felici, (Riccardo).** Sulle azioni elettriche dei corpi non conduttori soggetti all' influenze di un corpo elettrizzato. (Mem. della Soc. Italiana dei XL, Vol. II.) 48 pp. 2 plates. 4to.
Florence, 1871
Studies of the polarization of the dielectric.
—See also 1173.
1798. **Gherardi, S(ilvestro).** (1802–1879.) Ragguaglio di un altro manoscritto inedito del celebre Galvani. 29 pp. 4to.
Bologna, 1871
Latin text of an unpublished electro-physiological paper by Galvani with remarks on the manuscript by Prof. Gherardi.
- 1799.—**Sopra un' idea di telegrafo magnetico.** (Extract, Rivista Scient. Industr., 1871.) 15 pp. 8vo.
Florence, 1871
This letter refers to the allusion to a magnetic telegraph which occurs in Porta's *Magiae Naturalis*, 1589 (See No. 64); to Famianus Strada's *Proclusiones Academicæ*, 1617 (See No. 90); and van Etten's *Récréations Mathématiques*, 1626 (See No. 93).
—See also 570, 894.
1800. **Gramme, Z(enobie) T.** Sur une machine magnéto-électrique produisant des courants continus. 4 pp. ill. 4to. Paris, 1871
Note on the principle of the Gramme ring.
1801. **Green, George.** (1793–1841.) Mathematical papers edited by N. M. Ferrers. x+336 pp. 8vo.
London, 1871
The term *potential* first used; the concept of potential and its application to problems in general physics; propagation of light in crystalline media.
—See also 849.
1802. **Harkness, William.** (1837–1903.) Observations on terrestrial magnetism and on the deviations of the compasses of the United States iron-clad Monadnock during her cruise from Philadelphia to San Francisco, in 1865 and 1866. v+220 pp. Folio. (Smithsonian Contributions to Knowledge, No. 239.)
Washington, 1871
1803. **Helmholtz, Hermann (Ludwig Ferdinand).** (1821–1894.) On the relation of the physical sciences to science in general. Translated by C. F. Kroeh. (Smithsonian Report, 1871, pp. 217–234.) 8vo.
Washington, 1871
—See also 1259.
1804. **Kohlrausch, F(riedrich Wilhelm Georg).** Das Weber'sche compensirte Magnetometer zur Bestimmung der erdmagnetischen Intensität. 13 pp. 1 plate. 8vo.
Gottingen, 1871
Theory and use of Weber's magnetometer.
—See also 1723.
1805. **Le Couteur, P. E.** The questions of the syllabus of examination of masters in the laws of the deviation of the compasses of an iron ship, and in the means of compensating or correcting it, with their answers. 41 pp. 1 plate. 12mo.
Liverpool, (1871)

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1806. **Reynolds, (Sir) J(ohn) Russell.** (1828-1896.) Lectures on the clinical uses of electricity, delivered in University College Hospital. vii+112 pp. 8vo. *London, 1871*
1807. **Saint-Edme, Ernest.** L'électricité appliquée aux arts mécaniques, à la marine, au théâtre. xi+234 pp. ill. 8vo. *Paris, 1871*
Numerous applications of electricity explained and illustrated.
1808. **Scholl, G(ottlob) H(einrich) F(riedrich).** Grundriss der Naturlehre zum Behufe des populaeren Vortrags dieser Wissenschaft, neu bearbeitet von Dr. Boeksen. Seventh edition. viii+214 pp. ill. 8vo. *Ulm, 1871*
A school-primer with chapters on electricity and magnetism.
1809. **Snaith, W. A.** Magnetism and electricity for elementary classes. Seventh edition. 96 pp. ill. 16mo. *Manchester, (1871)*
Work written for beginners.
1810. **Steinschneider, Moritz.** (1816-1907.) Intorno ad alcuni passi d'opere del medio evo relativi alla calamita, lettere a D. B. Buoncompagni. (Extract, Bull. Bibliog. Storia Sc. Mat. Fis., Vol. 4.) 48 pp. 4to. *Rome, 1871*
References to the magnet by Arabian writers.
1811. **Villari, Emilio.** (1836-1904.) Sui fenomeni termici che si manifestano quando la corrente elettrica si stabilisce nel ferro ed in altri metalli. (Extract, Nuovo Cimento, Ser. II, Vol. 4.) 64 pp. 1 plate. 8vo. *Pisa, 1871*
Influence of magnetism on electric conductivity.
—See also 1894, 1927, 3521.
1812. **Volpicelli, P(aolo).** (1804-1879.) Su talune trasformazioni di forza viva in calorico e sulla quistione a cio relativa tanto fra Grassi e Galileo quanto per l'attrito dell'aria. (Atti Reale Accad. Sc. Rome, Vol. 24, pp. 136-164.) 4to. *Rome, 1871*
On the equality of work and heat: special reference to the controversy between Galileo and Father Grassi on the same subject.
—See also 1399.
1813. **Ward, J(ames) Clifton.** (1843-1880.) Elementary natural philosophy; being a course of nine lectures. vi+215 pp. ill. 1 plate. 12mo. *London, 1871*
Information adapted to the capacity of a juvenile audience.
1814. **Whewell, William.** (1794-1866.) Astronomy and general physics, considered with reference to natural theology. viii+328 pp. portr. 12mo. *London, 1871*
One of the Bridgewater treatises; short sections on the part which electricity and magnetism play in the mechanism of the atmosphere.
—See also 898.
1815. **Treatise upon terrestrial magnetism.** Containing an outline of the discoveries and theories connected therewith; an inquiry as to whether the terrestrial sphere has four or only two

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- magnetic poles; on the probable causes of terrestrial magnetism; on irregularities observed in the secular variation, etc. vi+179 pp. maps, diagrs. 8vo. *Edinburgh, 1871*
 Historical outline of magnetic discovery; variation of declination in time and place; charts of variation; the author's new magnetic theory.
1816. **Anderson, (Sir) James.** (1824-1893.) Statistics of telegraphy. viii+121 pp. 1 map. 8vo. *London, 1872*
 Discussion of the principles which affect the price of messages; also type of cable best suited for submarine telegraphy.
 —See also 3985.
1817. **Baille, J.** Wonders of electricity, translated from the French, edited with numerous additions by J. W. Armstrong. viii+335 pp. ill. pl. 8vo. (Illustrated Library of Wonders, Second Series.) *New York, 1872*
 Short description of an electric telephone, p. 142; the electrical work of *Charles G. Page*, p. 324.
 —See also 2061.
1818. **Blavier, E(douard) E(rneste).** (1826-1887.) Considérations sur le service télégraphique et sur la fusion des administrations, des postes et des télégraphes. 126 pp. 8vo. *Nancy, 1872*
 The postal telegraph; telegraph economist.
 —See also 1381.
1819. **Boernstein, Richard.** Zur Theorie von Ruhmkorff's Inductionsapparat. 44 pp. 8vo. (Inaugural dissertation.) *Berlin, 1872*
 Mathematical theory of the induction coil; discussion of results.
1820. **Bradley, L(everett).** Apparatus for electric measurement; with rules and directions for its practical application. 30 pp. 1 plate, tabl. 8vo. *Jersey City, 1872*
 Application of the author's galvanometer and rheostat to telegraph testing.
 —See also 3383.
1821. **Brooks, David.** (1820-1891.) Facts and inferences relating to lightning and lightning rods. 16 pp. 8vo. *Philadelphia, 1872*
 —See also 2067, 5387.
1822. **Cameron, Paul.** Variation and deviation of the compass rectified by azimuth and altitude tables, from the equator to the latitude of eighty degrees; likewise a treatise on magnetism and the deviation of the compass in iron ships. Fourth edition. vi+50+82 pp. ill. 2 plates. 8vo. *London, 1872*
1823. **Campbell, H(ugh).** Deafness; its various causes, and their successful removal by electrolysis, etc. vi+102 pp. ill. 12mo. *London, 1872*
1824. **Cecchi, Filippo.** (1822-1887.) Macchina dielettrica. (Extract, *Rivista Scient.-Industr.*, Vol. 4.) 8 pp. 8vo. *Florence, 1872*
 Electrostatic machine with plates made of insulating materials.
1825. **Colladon, (Jean) Daniel.** (1802-1893.) Mémoire sur les effets de la foudre sur les arbres et les plantes ligneuses et l'emploi des arbres comme paratonnerres. (Mém. Soc. Phys. Sc. Nat., Genève, Vol. 21, pp. 501-584.) 23 plates. 4to. *Geneva, 1872*
 Study of trees struck by lightning: the oak, elm, poplar, chestnut, etc.
 —See also 2188, 2444.

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1826. Collins, James. Report on the caoutchouc of commerce, being information on the plants yielding it, and the possibility of their cultivation and acclimation in India; with a memorandum on the same subject by Dr. Brandis. xii+55 pp. 4 plates. L. 8vo. *London, 1872*
Sources of supply, methods of preparation, prices, etc.
1827. De la Rive, Auguste (Arthur) (1801-1873) & (Edouard) Sarasin. (1843-1890.) Sur la rotation sous l'influence magnétique de la décharge électrique dans les gaz raréfiés. (Arch. Sc. Phys. Nat., Genève, Vol. 45, pp. 387-407.) 8vo. *Geneva, 1872*
The influence of a magnet in causing an electric discharge *in vacuo* to rotate.
—See also 818, 1794.
1828. Deschanel, Augustin Privat. (1821-1883.) Elementary treatise on natural philosophy, translated and edited with extensive additions by J. D. Everett. Part III. Electricity and magnetism. viii+pp. 505-783. ill. 1 plate. 8vo. *London, 1872*
Professor Everett has made this a very useful treatise; his additions refer mainly to electric potential and electrometers.
1829. Edelmänn, M(ax) Th(omas). Compensationsgalvanometer fuer Messungen nach absolutem Maasse. (Carl's Repertorium, Vol. 8, pp. 26-36.) 2 plates. 8vo. *Munich, 1872*
Description with drawings of the author's galvanometer for absolute measurements.
—See also 3687.
1830. Etenaud, Alfred. La télégraphie électrique en France et en Algérie depuis son origine jusqu'au 1er Janvier 1872, précédée d'une notice sur la télégraphie aérienne. 2 vols. 8vo. *Montepellier, 1872*
Brief general history of electric telegraphy; its development in France and Algeria arranged chronologically from 1844 to 1872.
—See also 4412.
1831. Gherardi, Silvestro. (1802-1879.) Intorno ad alcuni documenti relativi alla vita e agli studi del Galvani. (Extract, Rendiconti Accad. Sc., Istituto Bologna.) 3 pp. 8vo. *Bologna, 1872*
Note relating to the life and work of Galvani.
—See also 894.
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—See also 1909, 2319, 3180.
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The military telegraph and its use in different countries.
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Some notes on the development of electricity by friction.
—See also 4267.

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Mathematical paper on the principles of electrodynamics.
—See also 1259.
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Electrolytic reduction of iron.
—See also 907.
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The author attributes to Ampère in 1822 the invention of the electric telegraph.
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Standard work on electrical measurements.
- 1839a.—(English translation.) An introduction to physical measurements, with appendices on absolute electrical measurements, etc. Translated from the Second German edition by Thomas Hutchinson Waller and Henry Richardson Proctor. xii+249 pp. 8vo. *London, 1873*
- 1839b.—Second edition translated from the fourth German edition. xii+344 pp. 8vo. *London, 1883*
—See also 1723.
1840. Ludewig, Julius. Die Telegraphie in staats- und privatrechtlicher Beziehung vom Standpunkte der Praxis und des geltenden Rechtes zur Orientierung fuer ausuebende Beamte und das den Telegraphen benutzende Publikum. viii+200 pp. 8vo. *Leipzig, 1872*
The state in relation to telegraph companies. The author advocates state ownership.
—See also 1748.
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Experiments showing difference between the two kinds of electricity.

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Conditions for maximum sensitiveness in using the differential galvanometer.
—See also 1923, 2104, 2173, 3516.
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Collection of forty-two papers on mathematical and experimental physics.
—See also 1085.
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Paper on the operation of the field-telegraph.
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—See also 1757.
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—See also 3287.
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Changes in magnetic declination registered at the observatory of Moncalieri during the period 1870–1873.

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Note on Galvani; some of his manuscripts; his studies and discoveries. (Autograph copy, dedicated to Prof. Buff.)
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—See also 2085.

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—See also 2039, 2090, 2243, 3034.
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—See also 1996.
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—See also 2100.
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—See also 1085.

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—See also 1085, 3650.

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—See also 2066.

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—See also 1590.

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—See also 912.

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—See also 4604.

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—See also 1023.

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—See also 1748.
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—See also 1846.
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Manual of general physics.
—See also 2428, 3149.
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The articles are typewritten (except 11 which are in printed form) and in cases where they had been accompanied by illustrations, these have been clipped and added to the different articles. The whole forms a handy volume in 4to.

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Marseille & Paris, 1876

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—See also 1756.

2008. Towson, John Thomas. (1804-1881.) Practical information on the deviation of the compass; for the use of masters and mates of iron ships. 144 pp. ill. 8vo. *London, 1876*
General information on the compass; also practical rules.

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Sevilla, 1878
—See also 1586.
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The influence of static electricity on the flow of liquids through tubes of small bore.
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Rome, 1876
Answer to objections raised by Prof. Pisati against Melloni's theory of electrostatic induction. (See No. 1290, 1949, 1993.)
- 2013.—Teoria della elettrostatica induzione. (Atti Accad. Lincei, Ser. II, Vol. 3, pp. 896-911.) ill. 4to. *Rome, 1876*
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Brussels, 1877
Mechanical and electrical details of the underground telegraph line between Halle and Berlin.
—See also 2266.

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 Reis's telephonic work, p. 78.
 —See also 2063, 3489.
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 —See also 4291.
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2104. **Schwendler, (Carl) Louis.** (1838-1882.) *Instructions for testing telegraph lines and the technical arrangements of offices.* Written on behalf of the Government of India, under the Orders of the Director-General of Telegraphs of India. Second edition. 2 vols. 8vo. *London & Edinburgh, 1878-1880*
Details of the practical methods for testing in general use; their mathematical theory.
- 2105.——*Précis of report on electric light experiments.* 15 pp. Folio. *London, 1878*
The experiments were made prior to the introduction of the electric light on railway stations in India.
—See also 1846.
- 2105bis. **Scott de Martinville, E. Léon.** *Le problème de la parole s'écrivant. La France, 1853-1861-1877. L'Amérique, 1877-1878. Première édition provisoire.* 78 pp. 8vo. *Paris, 1878*
—See also 2006bis.
2106. **Shoolbred, J(ames) N(ugent).** *On the present state of electric lighting.* 27 pp. 2 plates. 8vo. *London, 1878*
Short paper on generating machinery, lamps, regulators.
—See also 2176, 3971.
2107. **Siemens, (Sir) Charles William.** (1822-1883.) *Die Eisen- und Stahl-Industrie in England. Der Barometer.* 83 pp. ill. 8vo. *Berlin, 1878*
The deep-sea thermometer.

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- 2108.—On the utilization of heat and other natural forces. 32 pp. ill. 12mo. *London, 1878*
General considerations on various forms of available energy.
—See also 1654.
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Growth of the electric telegraph: Le Sage, Cavallo, Ronalds, Romagnosi, Soemmering; work of Cooke, Wheatstone and Morse; origin of the Morse alphabet; origin of the galvanometer.
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Description of Schaeffler's multiplex telegraph.
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Paper of 118 pages on the famous Harlem magnets; also on methods of making electromagnets.
—See also 1304.
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Theory of the electrostatic condenser.
—See also 1399.
2116. **Watt, Alexander.** (1823–1892.) The microphone, with notes on the telephone and phonograph. 64 pp. 16mo. *London, (1878)*
Popular exposition of the physical principles of the telephone and telegraph.
—See also 1928.

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Some aspects of the transformation of energy.
—See also 1110.
2119. **Zetzsche**, (Karl) Ed(uard). (1830-1894.) Ueber den Antheil Petrina's an der Erfindung des telegraphischen Gegensprechens. (Zeitschr. Math. Phys. Hist.-Litt. Abtl., Year 23, pp. 37-45.) 8vo. *Leipzig, 1878*
Petrina's share in the discovery of duplex telegraphy.
—See also 1632.
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London, (1878)
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A popular account of the two instruments.
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General account of Smee's electro-metallurgical work; his battery, p. 16.
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Description of the various methods that have been used together with a

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practical exposition of the systems actually employed; preceded by a history and followed by a bibliography of the subject.

—See also 2265, 3907.

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Notes of a popular lecture: Romagnosi (not Romagnesi) said to have discovered in 1802 that an electric current could produce mechanical motion. An electro-motor made in 1831 by the Paduan monk Salvator del Negro.
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History and physics of polar auroræ.
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Allusion in 1762 to a form of *printing telegraph*; see footnote p. 567.
2132. **Cavendish**, Henry. (1730–1810.) Electrical researches, written between 1771 and 1781. Edited from the original manuscripts in possession of the Duke of Devonshire, by J(ames) Clerk Maxwell. lxxi+454 pp. ill. 8vo. *Cambridge, 1879*
The collection contains the author's two papers published in the Philosophical Transaction of 1771 and 1776 together with considerations on the nature of electrification and also investigations in the mathematical theory of charged conductors.
—See also 2462.
2133. **Clark**, (Josiah) Latimer. (1822–1898.) Notes from the letters and other papers of Sir William Fothergill Cooke. In connection with the invention of the electric telegraph, 1836–1875. iii pp. Folio *(London,) 1879*
The notes (manuscript) are arranged in chronological order.
—See also 1509.
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The mechanical equivalent of the energy of certain electrical operations; a mathematical paper.
—See also 1669.

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—See also 1223.
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—See also 1545, 1703, 3543.
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Electricity and magnetism mathematically treated; also chapters on general telegraph testing.
—See also 2281.
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—See also 2191, 2230, 4065.

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The lectures were given at the Royal Institution in 1879. Lecture III. contains description of the author's apparatus for the determination of dielectric capacity.
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Differences between positive and negative electricity as shown by Lichtenberg's dust figures; Lullin's experiment on the perforation of cards by the discharge of a Leyden jar.
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—See also 2425, 3199.

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(Autograph copy, dedicated to Josiah Latimer Clark.)
—See also 1753.
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Memorial volume commemorating the inauguration of a statue to Prof. Morse in New York City. History of prominent inventors and important American telegraph companies. (This is the second title-page. The first title-page reads: The telegraph in America and Morse memorial, and in memoriam W. Orton.)
—See also 3892.
2167. Riecke, (Karl Victor) E(duard). Ueber das ponderomotorische Elementargesetz der Elektrodynamik. (Abh. Ges. Wiss., Goettingen, Vol. 24, pp. 1-68.) 4to. *Gottingen, 1879*
Six mathematical papers on electrodynamical subjects.
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dem Werke desselben Verfassers: "Die Magnet- und dynamo-elektrischen Maschinen, etc." pp. 336-426. ill. 8vo.

Cologne, 1880

- 2170b.—Die magneto- und dynamo-elektrischen Maschinen, ihre Construction und praktische Anwendung zur elektrischen Beleuchtung. Second edition. (Zweite nach dem gegenwaertigen auf der Pariser elektrischen Ausstellung vertretenen Zustande dargestellte und vermehrte Auflage.) xv+656 pp. 8vo.

Cologne, 1882

- 2170c.—(English translation.) Magneto-electric and dynamo-electric machines, their construction and practical application to electric lighting and the transmission of power. Translated from the third German edition by Nathaniel S. Keith and Percy Neymann, with large additions and notes relating to American machines. Vol. I. ill. 8vo. *New York, 1884*

—See also 1069.

2171. Schulze, F. W. On periodical change of terrestrial magnetism; read before the North China branch of the Royal Asiatic Society on June 14th, 1878. 64 pp. ill. 8vo.

Shanghai & London, 1879

The revolution of the magnetic pole round the geographic is held to be caused by attraction between heavenly bodies and the earth's fiery, liquid interior; numerous quotations and references of interest.

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The standard suggested is a small incandescent platinum loop.

—See also 1846.

2174. Scudder, Samuel H(ubbard). Catalogue of scientific serials of all countries, including the transactions of learned societies in the natural, physical and mathematical sciences, 1633-1876. xii+358 pp. 8vo.

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A valuable bibliography.

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—See also 1892.
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—See also 1586.
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Papers on sound; the duration of the electric spark.
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—See also 3990.

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Edinburgh, 1880
Description and uses of a differential telephone together with the mathematical theory of the instrument.
—See also 4353.
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London, 1880
An engineering study; the relative advantages of the Mont Blanc and Simplon tunnels, preliminary work.
—See also 1825.
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General information for an intending user of electric light.
—See also 2229, 4175.
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—See also 2207, 3937.
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—See also 2143.
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Simple account of the telephone written for the general reader.
—See also 2080.
2194. **Gordon**, J(ames) E(dward) H(enry). (1852-1893.) Physical treatise on electricity and magnetism. 2 vols. ill. pl. 8vo.
London, 1880
Details of important electric and magnetic measurements made by the author.
—See also 2145.
2195. **Heilemann**, F. J. Der Blitzableiter, das neueste ueber dessen Herstellung und Sicherheit bringende Anwendung. Wichtig fuer Baumeister und Fachleute, sowie fuer jeden Haus- und Landwirth. Nebst einer Abhandlung ueber Electricitaet. 36 pp. ill. 8vo.
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Notes on the velocity of electrical transmission; thunderstorms; lightning rods.
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Berlin, 1880
Paper on lightning conductors.
—See also 1214, 1259, 1548.

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2197. Hoffmeyer, N(iels). (1836-1884.) Étude sur les tempêtes de l'Atlantique septentrional et projet d'un service télégraphique international relatif à cet océan. 54 pp. 7 maps. 8vo.
Copenhagen, 1880
Necessity of meteorological stations on the Faroe Islands, Iceland and Greenland.
2198. Holtz, W(ilhelm Theodor Bernhard). Ueber die Zunahme der Blitzgefahr und ihre vermuthlichen Ursachen. Eine Statistik der Gewitter, der Blitzeinschlaege in Gebaeude, der blitzbezuglichen baulichen Einrichtungen und der Verluste durch Blitz, auf Grund zahlreicher Mittheilungen aus Deutschland, Oesterreich und der Schweiz. 158 pp. 8vo. *Greifswald, 1880*
Destruction of life and property by lightning.
—See also 1982.
2199. Johnston, W(illiam) J(ohn). Telegraphic tales and telegraphic history, a popular account of the electric telegraph, its uses, extent and outgrowths. 254 pp. 12mo. *New York, (1880)*
—See also 2032.
2200. Jones, John. The sun a magnet. 44 pp. ill. 12mo.
Dundee, 1880
Among subjects treated are: the general structure of the sun, star-twinkling, comets' tails. The author's views are somewhat startling.
2201. Levander, F(rederick) W(illiam). Solutions of the questions in magnetism and electricity, set at the preliminary scientific and first B. Sc. pass examinations of the University of London, from 1860 to 1879, together with definitions, dimensions of units, miscellaneous examples, etc. 94 pp. ill. 12mo.
London, 1880
Useful for College and University students.
2202. Maigne, W. Nouveau manuel complet du fabricant d'objects en caoutchouc, gutta-percha, gomme factice, toile et taffetas cirés, suivi de l'imperméabilisation des étoffes, papiers, cuirs etc. 2 vols. 3 plates. 16mo. *Paris, 1880*
Practical handbook for the manufacture of gutta percha.
2203. Mercadier, E. Traité élémentaire de télégraphie électrique, leçons faites à l'administration centrale des télégraphes à l'usage des auxiliaires. 261 pp. ill. 12mo. *Paris, 1880*
The elements of telegraphy.
2204. Molesworth, (Sir) Guillford L(indsey). Pocket-book of useful formulæ and memoranda for civil and mechanical engineers. 20th edition. viii+610 pp. ill. 32mo. *London, 1880*
2205. Morton, Henry. (1836-1902.) Reports on the topophone and the electric light. (Annual Report, Light-house Board, Append.) 50 pp. ill. 8vo. *Washington, 1880*
The *topophone* was devised for the purpose of aiding navigators in determining the position of distant fog-signals. Arc and incandescent lighting considered.
—See also 2292.

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2206. Pelletier, A. L. & Taupin d'Auge. La pose et l'entretien des sonneries électriques mises à la portée de tout le monde. 72 pp. ill. L. 8vo. *Paris, 1880*
Practical paper on the installation and maintenance of electric bells.
2207. Ronalds, (Sir) Francis. (1788-1873.) Catalogue of books and papers relating to electricity, magnetism, the electric telegraph, etc., including the Ronalds library; with a biographical memoir of the author, edited by Alfred J. Frost. xxvii+564 pp. 8vo. *London, 1880*
Catalogue compiled by Sir Francis Ronalds and edited by Alfred J. Frost who died in 1881 at the early age of 38. It contains 13,000 entries with numerous notes, historical and critical; also biographical notice of Sir Francis Ronalds. (See Nos. 3937, 5505, 5667a.)
—See also 803, 2190.
2208. Saavedra, Antonino Suarez. Tratato de telegrafia. Vol. I. Historia universal de la telegrafia. Second edition, revised and enlarged. 656 pp. ill. 8vo. *Barcelona, 1880*
Historical and practical handbook. On p. 110, the C. M. of the Scots Magazine is said to be Charles Marshall. (See No. 378.)
2209. Scharnweber, L. Die elektrische Hausteleggraphie. Handbuch fuer Techniker, Mechaniker und Bauschlosser. 125 pp. ill. 8vo. *Berlin, 1880*
General information on telegraphy and telephony.
2211. Sleeman, C(harles) W(illiam). Torpedoes and torpedo warfare, containing a complete and concise account of the rise and progress of submarine warfare; also a detailed description of all matter appertaining thereto, including the latest improvements. viii+309 pp. 5 plates. L. 8vo. *Portsmouth, 1880*
Practical information on submarine mines and methods of firing them.
2212. Somzée, Léon. Nouveau procédé d'éclairage électrique. 22 pp. 1 plate. 8vo. *Schaerbeek, 1880*
Finely divided particles of carbon used instead of pencils or filaments for electric lighting.
2213. Spon, Ernest. Supplement to Spon's Dictionary of engineering, civil, mechanical, military and naval. (Letter Co. to In.) ill. L. 8mo. *London, 1880*
A number of electrical articles.
—See also 2392, 4103.
2214. Swan, J(oseph) W(ilson). Electric lighting. 24 pp. 1 plate. 8vo. *Newcastle-upon-Tyne, 1880*
Progress made in electric lighting during the period 1878-1880. General advantages of the incandescent light, its division, subdivision and measurement.
—See also 4202.
2215. Thayer, Ella Cheever. Wired love; a romance of dots and dashes. 256 pp. 12mo. *New York, 1880*
2216. Urquhart, J(ohn) W. Electric light, its production and use embodying plain directions for the working of galvanic bat-

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- teries, electric lamps and dynamo-electric machines, edited by F. C. Webb. xiv+290 pp. ill. 12mo. *London, 1880*
- 2217.—Electro-plating, a practical handbook including the practice of electro-typing. viii+216 pp. ill. 1 plate. 12mo. *London, 1880*
Compact practical handbook.
—See also 2302.
2218. Wilson, Frederik J(ohn) F(arlow). Stereotyping and electro-typing, a guide for the production of plates by the papier-mâché and plaster processes; with instructions for depositing copper by the battery or by the dynamo machine, also hints on steel and brass facing. xv+195 pp. ill. pl. 12mo. (Wyman's Technical Series.) *London, 1880*
The second part contains a brief history of electrolytic deposition, also details of various processes used.
2219. Zetzsche, (Karl) Eduard. (1830-1894.) Geschichte und Entwicklung des elektrischen Fernsprechwesens. Second edition. 64 pp. ill. 8vo. *Berlin, 1880*
History and operation of the electric telephone.
—See also 1632.
2220. Allard, É(mile). Mémoire sur les phares électriques, comprenant le programme de l'éclairage électrique des côtes de France complété par des signaux sonores à vapeur. xiii+87 pp. 8 maps. 8 plates. 4to. *Paris, 1881*
Electric light in coast illumination; generators used; optical apparatus; maps and illustrations.
—See also 5467.
2221. Armengaud, Jacques Eugène. (Senior.) (1810-1891.) Manuel de l'éclairage électrique. Sources et générateurs d'électricité. Lampes et régulateurs. Éclairage par incandescence et par arc voltaïque. Division et distribution de la lumière. vi+232 pp. 12mo. *Paris, 1881*
Dates of patents and short description of electric generators, glow lamps, arc lamps, etc.
2222. Arthuis, A(rthur). L'électricité statique et l'hystérie; mémoire précédé d'une lettre à M. le professeur Charcot. 72 pp. 8vo. *Paris, 1881*
History of the application of static electricity to medical cases; details of the author's work.
—See also 2184.
2223. Avenarius, (Michael Petrowitsch). Méthode pour la division de la lumière électrique. 4 pp. 1 plate. 4to. *Paris, 1881*
A brief note on the subdivision of the electric light.
2224. Bede, É(mile). La téléphonie. Histoire, description et application des téléphones. 114 pp. 8vo. *Brussels, 1881*
Popular account of the various telephone systems.
—See also 4842.

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2225. **Bell, Alexander Graham.** Upon the production of sound by radiant energy. Paper read before the National Academy of Sciences, April 21, 1881. 45 pp., including 11 plates. 8vo.
Washington, 1881
The photophone; production of sound by light with numerous illustrations.
—See also 1967bis, 2006bis, 2125, 2268, 3867.
2226. **Blavier, Édouard E(rneste).** (1826–1887.) Des grandeurs électriques et de leur mesure en unités absolues. 587 pp. ill. 1 plate. 8vo.
Paris, 1881
Determination of the ohm and other units together with relevant physical and mathematical matter.
—See also 1381.
2227. **(Boggett, William.)** Thoughts on the source of life; also recent speculations on electricity, and other subjects. By an octogenarian. 42+8 pp. 8vo.
London, 1881
The author suggests the view that electricity is the active principle of life, p. 9.
—See also 2347, 2380, 2404, 2430, 2434.
2228. **Cazin, A(chille Auguste).** (1832–1877.) Traité théorique et pratique des piles électriques, mesure des constantes des piles, unités électriques, description et usage des différentes espèces de piles; annoté et publié par Alfred Angot. vi+311 pp. ill. 8vo.
Paris, 1881
Primary batteries and thermopiles.
—See also 3336.
2229. **Crompton, R(ookes) E(velyn) B(ell).** Artificial lighting in relation to health. 27 pp. 8vo.
London, 1881
Points in the physics of electric lighting.
—See also 2189.
2230. **Garratt, B. Copson.** Magnetism and electricity, their curative properties explained. 20 pp. 8vo.
London, 1881
It is held that magnetism has in many cases exercised a marvelous control over mental as well as physical troubles.
—See also 2143.
2231. **Giacomini, Ferdinando.** Circuiti telegrafici; breve trattato di telegrafia elettrica con unito Atlante di diciotto tavole. Second edition. 100 pp. 12mo+Atlas=18 tables. 4to.
Milan, 1881
Short description of telegraphic manipulation with numerous plates.
2232. **Helmholtz, (Hermann Ludwig Ferdinand).** (1821–1894.) Ueber die auf das Innere magnetisch oder dielektrisch polarisirter Koerper wirkenden Kraefte. (Sitz. Ber. Akad. Wiss. Math.-Nat. Kl., 1881, pp. 191–213.) 8vo.
Berlin, 1881
Contribution to the mathematical theory of magnetism.
—See also 1259.
2233. **Hirn, G(ustav) A(dolph) (1815–1890) & O. Hallauer.** Thermodynamique appliquée. Réfutations d'une critique de G. Zeuner. 91 pp. 1. 8vo.
Paris, 1881
Controverted points in the thermodynamics of the steam-engine.

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2234. Hope, Ascott R(ober) t. i. e. (Ascott Robert Hope **Moncrieff**). Wonders of electricity. 128 pp. ill. 1 plate. 12mo.
Adapted to the wants of the general reader.
London, (1881)
2235. Hospitaler, É(douard). (1852-1907.) La physique moderne, les principales applications de l'électricité. iii+343 pp. ill. 4 plates. L. 8vo. (Bibliothèque de la Nature.) *Paris, 1881*
Popular exposition of the principles of electro-motors, dynamos, electric lighting, telephony, etc.
- 2235a.—(English translation.) The modern applications of electricity. Translated and enlarged by Julius Maier. viii+463 pp. ill. pl. 8vo.
London, 1882
- 2235b.—Second edition, revised with many additions. 2 vols. ill. pl. 8vo.
London, 1883
—See also 2327, 2382.
2236. Jamieson, A(ndrew). Laying and repairing submarine telegraph cables. 45 pp. 1 map. ill. 8vo.
Glasgow, 1881
Popular lecture on submarine cables with map and illustrations.
—See also 2370, 2384, 4133.
2237. Jenkin, (Henry Charles) Fleeming. (1833-1885.) Electricity. 128 pp. ill. 16mo. (Manuals of Elementary Science.)
London, 1881
The fundamental principles written by a master of the subject.
—See also 1677.
2238. Joubert, J(ules François). Études sur les machines magnéto-électriques. 46 pp. 4to.
Paris, 1881
General theory; measurement of coefficient of self-induction; the electro-dynamometer; alternating currents. Established the fundamental principles of the alternating current generator.
—See also 2288.
2239. Kohlfuerst, L(udwig). Die elektrischen Wasserstands-Anzeiger. 71 pp. ill. 8vo.
Berlin, 1881
Electric water-level gauge.
—See also 3951.
2240. Korteweg, D(iederich) J(ohannes). Ueber das ponderomotorische Elementargesetz. (Journ. Mathem., Vol. 90, pp. 49-70.) 4to.
Berlin, 1881
Mathematical paper on the force between two elements of current.
—See also 4088.
2241. Lartigue, Henry. (1830-1884.) Les signaux électriques employés sur les chemins de fer. 36 pp. 12mo.
Paris, 1881
Summary of a lecture on electric signals for railway purposes.
2242. Lintern, William. Magnetic surveying and angular surveying; with records of the peculiarities of needle disturbances, compiled from the results of carefully made experiments. vi+60 pp. 12mo. (Weale's Rudimentary Series, No. 220.)
London, 1881

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2243. **Maxwell**, James Clerk. (1831-1879.) Elementary treatise on electricity, edited by William Garnett. xvi+208 pp. ill. pl. 8vo. (Clarendon Press Series.) *Oxford, 1881*
Suggestive treatise written for the non-mathematical student.
—See also 1872.
2244. **Miller**, William Allen. (1817-1870.) Magnetism and electricity, corrected from the fourth London edition. 213 pp. ill. 8vo. *New York, 1881*
A College text-book.
—See also 1328.
2245. **Montigny**, Ch(arles Marié Valentin). (1819-1890.) Notice sur les effets de la foudre sur les arbres placés près d'un fil télégraphique. 20 pp. 8vo. *Brussels, 1881*
A telegraph line a source of danger during thunder storms; effect of line on trees.
—See also 3197.
2246. **Nicoll**, Henry J(ames). Great movements and those who achieved them. iv+456 pp. portr. 8vo. *London, 1881*
The inventor and improvers of the steam-engine; also the early workers in the field of electric telegraphy.
2247. **Pellat**, (Joseph Solange) H(enri). Différence de potential des couches électriques qui recouvrent deux métaux au contact. 133 pp. 4to. (Thèse.) *Paris, 1881*
Doctor's thesis on contact electricity. The author's experiments go to show that the difference of potential between the electric charges on two metallic plates is the same as the potential difference between the plates themselves.
2248. **Piaud**, M. L. Notice sur le compas Thomson d'après une conférence fait par l'inventeur à la Royal United Service Institution. 13 pp. ill. 8vo. *Paris, 1881*
The Kelvin navigating compass and mode of compensation.
2249. **Preece**, (Sir) William Henry. Sur la mesure pratique des grandeurs électriques. 23 pp. L. 8vo. *Paris, 1881*
Practical measurement of electric quantities.
—See also 1496.
2250. **Radau**, (Jean Charles) R(udolph). Le magnétisme. Second edition. 328 pp. ill. pl. 12mo. (Bibliothèque des Merveilles.) *Paris, 1881*
Terrestrial magnetism treated at length.
2251. **Rosetti**, Francesco. (1833-1895.) Sullo stato presente delle telegrafia e della telefonia: brevi cenni. 35 pp. 8vo. *Padova, 1881*
Progress and actual state (1881) of telegraphy and telephony.
—See also 2099.
2252. **Rossetti**, F(rancesco) (1833-1895) & G(iovanni) **Cantoni** (1818-1897.) Bibliografia Italiana di elettricità e magnetismo: saggio compilato per incarico del Ministero d'Agricoltura, Industria e Commercio in occasione della mostra internazionale

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- di elettricità che si apre a Parigi nell' Agosto 1881. 117 pp.
L. 8vo. *Padova, 1881*
Catalogue of Italian electricians with editions of their publications.
—See also 2099.
2253. **Rothen, T.** Les mesures électriques. 67 pp. 8vo. *Bern, 1881*
The fundamental units and practical standards.
2254. **Rowell, G(eorge) A(ugustus).** Electric meteorology: an endeavour to show the general agency of electricity in the cause of rain and its allied phenomena. With an appeal for the consideration of the theory advanced. 44 pp. 8vo.
Oxford, 1881
Excessive rain in mountainous districts; effects of forests on rainfall.
—See also 1465.
2255. **Salvatori, F(edele).** Istruzioni sull' uso del Ponte di Wheatstone. 70 pp. ill. 8vo. *Rome & Florence, 1881*
Practical instructions on the Wheatstone's bridge.
—See also 4648.
2256. **Sawyer, William Edward.** (? -1883.) Electric lighting by incandescence, and its applications to interior illumination: practical treatise. 189 pp. ill. 8vo. *New York, 1881*
A general handbook.
2257. **Schneebeli, Heinr(ich).** (1849-1890.) Ueber Condensatoren im Allgemeinen und specielle Beschreibung des Normalcondensators des eidgenoessischen Polytechnikums. (Vierteljahrschr. Zuericher Naturf.-Ges., Vol. 26, pp. 160-185.) 8vo.
Zurich, 1881
The use of condensers, theory and practice.
—See also 4101.
2258. **Siemens, (Sir) Charles) William.** (1822-1883.) On some applications of electric energy to horticulture and agriculture. 16 pp. ill. 8vo. *London, 1881*
Results of exposing plants to the influence of the electric light.
- 2259.— **—Le gaz et l'électricité comme agents de chauffage, traduit avec l'autorisation de l'auteur par Gustave Richard.** 36 pp. ill. 12mo. *Paris, 1881*
The original title of Dr. Siemens' paper read "On gas and electricity as heating agents."
—See also 1654.
2260. **Siemens, (Ernst) Werner.** (1816-1892.) Gesammelte Abhandlungen und Vortraege. viii+582 pp. ill. portr. 6 plates. 8vo. *Berlin, 1881*
Several important electrical papers written by the author.
—See also 1214.
2261. **Smith, Willoughby.** (1828-1891.) Résumé of the earlier days of electric telegraphy. 56 pp. 8vo. *(London, 1881)*
Pamphlet on matters connected with submarine cables.
—See also 2006.

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2262. **Thompson, Silvanus P(hillips).** Elementary lessons in electricity and magnetism. xiv+446 pp. ill. map. 12mo. *London, 1881*
This is the first edition of an excellent elementary text-book. (See No. 2371.)
—See also 2338, 2376, 3847.
2263. **Tommasi, Donato.** De l'équilibre thermique dans les actions chimiques. 12mo. 8vo. *Saint-Denis, 1881*
Physico-chemical paper.
—See also 2301, 2342.
2264. **Alglave, Ém(ile) & J. Boulard.** La lumière électrique, son histoire, sa production et son emploi dans l'éclairage public ou privé, les phares, l'industrie etc. xix+464 pp. ill. 24 plates. L. 8vo. *Paris, 1882*
General description with illustrations of dynamos, lamps, regulators, etc.
—See also 5451.
2265. **Anderson, Richard.** The lightning rod. On the necessity for a regular inspection of lightning conductors. 45 pp. ill. 8vo. *London, 1882*
History and practice of the lightning-rod.
—See also 2126.
2266. **Banneux, J(oseph).** Le téléphone à grande distance. 8 pp. Folio. *Brussels, 1882*
Account of telephonic research by van Rysselberghe.
—See also 2017.
2267. **Bartholow, Roberts.** (1831-1904.) Medical electricity, a practical treatise on the applications of electricity to medicine and surgery. Second edition. 291 pp. ill. 8vo. *Philadelphia, 1882*
Written for use of the medical practitioner.
2268. **Bell, Alexander Graham.** Upon the electrical experiments to determine the location of the bullet in the body of the late President Garfield; and upon a successful form of induction balance for the painless detection of metallic masses in the human body. With an appendix. 58 pp. ill. 8vo. *Washington, 1882*
The induction balance devised by the author.
—See also 2225.
2269. **Bjerknes, (Carl Anton).** (? -1903.) Phénomènes hydrodynamiques inversement analogues à ceux de l'électricité et du magnétisme. 30 pp. ill. 8vo. *Paris, 1882*
Hydrodynamical experiments closely imitating certain phenomena of electricity and magnetism.
2270. **Bonel, A.** L'électricité à l'exposition de Bordeaux, 1882. 59 pp. ill. L. 8vo. *Bordeaux, 1882*
General account of telegraph and electric-light apparatus.
—See also 1382.
2271. **Campbell, Lewis & William Garnett.** Life of James Clerk Maxwell (1831-1879), with a selection from his correspondence and occasional writings and sketch of his contributions to science. xvi+662 pp. ill. 1 plate. 3 portr. 8vo. *London, 1882*

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2272. **Clark**, (Josiah) Latimer. (1822-1898.) Treatise on the transit instrument as applied to the determination of time. 72 pp. 1 plate. 8vo. *London, 1882*
Work written to enable the amateur to obtain true time whereby to regulate clocks and watches.
—See also 1509.
2273. **Collet**, A(lfred Joseph). Traité théorique et pratique de la régulation et de la compensation des compas avec ou sans relèvements, compas compensé de Sir William Thomson et appareils auxiliaires, compas compensé et compas correcteur de M. J. Peichl. xl+295 pp. ill. L. 8vo. *Paris, 1882*
Mathematical theory with practical conclusions regarding the compensation of ships' compasses.
- 2273a.—(English translation.) Practical guide for compensation without bearings. Translated by W. Bottomley, with preface by Sir William Thomson. xv+56 pp. 2 maps. 8vo. *Portsmouth, 1885*
2274. **Day**, R(ichard) E(van). Electric light arithmetic. vi+80 pp. 16mo. *London, 1882*
Problems for elementary classes.
—See also 1972.
2275. **Delarge**, F(rédéric Henri.) Notes sur l'électricité dynamique. 88 pp. 1 plate. 8vo. *Brussels, 1882*
Definitions of electrical quantities and measurements of some of them.
—See also 1717.
2276. **Dredge**, James, (1840-1906.) Electric illumination, by Conrad W. Cooke, James Dredge, M. F. O'Reilly, S. P. Thompson and H. Vivarez, with abstracts of specifications having reference to electric lightning, prepared by W. L. Wise. 2 vols. ill. Folio. *London, (1882-1885)*
Comprehensive illustrated work including electric measurements, descriptions of dynamos and lamps; also abstracts of patents. One of the contributors, Dr. M. F. O'Reilly is also known as Brother Potamian. (See No. 1015.)
2277. **Du Moncel**, Th(éodore Achille Louis). (1821-1884.) Le microphone, le radiophone et le phonographe. 304 pp. ill. pl. 12mo. (Bibliothèque des Merveilles.) *Paris, 1882*
—See also 1223.
2278. **Du Moncel**, Th(éodore Achille Louis) (1821-1884) & (Sir) W(illiam) H(enry) **Preece**. Incandescent electric lights, with particular reference to the Edison lamps at the Paris exhibition; to which is added the economy of the electric light by incandescence by J. W. Howell; and on the steadiness of the electric current by C. W. Siemens. 176 pp. ill. pl. 16mo. (Van Nostrand Science Series, No. 57.) *New York, 1882*
Paper on the dynamo-electric current by Dr. C. W. Siemens; also one by Prof. Howell of the Stevens Institute on "Economy of electric lighting."
—See also 1223, 1496.

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2279. **Duter, É(mile).** Cours d'électricité. (Classe de Rhétorique.) 265 pp. ill. 12mo. *Paris, 1882*
An elementary text-book.
2280. **Ermacora, G. B.** Sopra un modo d'interpretare i fenomeni elettrostatici, saggio sulla teoria del potenziale. xxxviii+468 pp. 8vo. *Padova, 1882*
Phenomena of static electricity mathematically treated.
2281. **Ferrini, R(inaldo Eugenio Domenico Tranquillo) & P. Pogliaghi.** La luminosità elettrica dei gas e la materia radiante. xv+315 pp. ill. pl. 8vo. *Milan, 1882*
Electric discharge in air and in rarefied media.
—See also 2140.
2283. **Gore, G(eorge).** Scientific basis of national progress including that of morality. 218 pp. 12mo. *London, 1882*
Plea for nature study and scientific research.
—See also 1357.
2284. **Holmes, A(rthur) B(romley).** The electric light, popularly explained. Third edition. 110 pp. ill. 1 plate. 12mo. *London, 1882*
—See also 2326.
2285. **Lockwood, T(homas) D.** Practical information for telephonists. 192 pp. 12mo. *New York, 1882*
Information for telephone operators and inspectors.
—See also 835c, 2329, 4317.
2286. **Lusson, F.** Les origines de l'électricité. 16 pp. 8vo. *La Rochelle, 1882*
The salient points in electrical discovery.
2287. **Malapert, E.** Dimensions des unités électriques en fonction des unités fondamentales. (Centimètre-gramme-seconde.) 68 pp. L. 8vo. *Paris, 1882*
Besides the fundamental and derived units, the pamphlet discusses many points in electric and electro-magnetic theory.
2288. **Mascart, É(leuthère) É(lie) N(icolás) & J(ules François) Joubert.** Leçons sur l'électricité et le magnétisme. 2 vols. ill. 8vo. *Paris, 1882-1886*
Standard treatise; based upon lectures delivered by Prof. Mascart at the College de France.
- 2288a.—(English translation.) A treatise on electricity and magnetism. Translated by E. Atkinson. 2 vols. 8vo. *London, 1883-1888*
—See also 1987, 2238.
2289. **Merling, A.** Die elektrische Beleuchtung in systematischer Behandlung; Konstruktion und Betriebsverhaeltnisse der Lichtmaschinen, elektrischen Lampen und Kerzen. xii+504 pp. ill. 8vo. (Elektrotechnische Bibliothek, Vol. I.) *Brunswick, 1882*
General treatment of generators and of arc and incandescent lighting.
—See also 2158.

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2290. **Meyer, H(enry) R(ober) t.** The development of electricity and the solution of the problem of the wires. 15 pp. 2 plates. 8vo. *Liverpool, 1882*
Proposal of a permanent conduit for electrical conductors.
2291. **Moerman, Théophile.** Notice sur l'électro-métallurgie ou extraction économique et rapide des métaux précieux de leurs minerais basé sur l'emploi de l'électricité pour tout faire. 43 pp. 8vo. *Paris, 1882*
Historical notes.
2292. **Morton, Henry (1836-1902) & W. A. Anderson.** Electric lighting, and the underwriters' standard requirements in reference thereto, with instructions for the proper inspection of electric light equipments. 65+iv pp. ill. 8vo. *1882*
The electric circuit with practical instructions on electric lighting.
—See also 2205.
2293. **Newall, R(ober) t S.** Facts and observations relating to the invention of the submarine cable and to the manufacture and laying of the first cable between Dover and Calais in 1851. 8 pp. 8vo. *London, 1882*
The author claims to have been the first to suggest a submarine cable, p. 1.
—See also 3198.
2294. **Parnell, Arthur.** Action of lightning and the means of defending life and property from its effects. xiii+303 pp. 12mo. *London, 1882*
General electrical data, also numerous instances of the effects of lightning.
—See also 4278.
2295. **Parville, (François) Henri (Peudefer) de.** L'électricité et ses applications, Exposition de Paris. 536 pp. ill. pl. 12mo. *Paris, 1882*
Written for the general reader.
2296. **Picou, R(omuald) V(ictor).** Manuel d'électrométrie industrielle. 155 pp. 8vo. *Paris, 1882*
Short, practical handbook of electrical measurement.
2297. **Siemens, Friedrich. (1826-1904.)** Bericht ueber die Smoke Abatement Exhibition, London, Winter 1881-1882. 136 pp. ill. L. 8vo. *Berlin, 1882*
2298. **Smith, Willoughby. (1828-1891.)** Induction. 17 pp. 4 plates. 8vo. *London, 1882*
Short paper on current induction.
—See also 2006.
2299. **Thomson, (Sir) William (Lord Kelvin). (1824-1907.)** Mathematical and physical papers. Vol. I. 8vo. *Cambridge, 1882*
Papers on the dynamical theory of heat and on electrolysis.
—See also 1085.
2300. **Tiemann, Conrad.** Der elektrische Telegraph. Ein Buch fuer Jedermann. Leicht verstaendliche Abhandlungen ueber das gesammte technische Telegraphenwesen, Beschreibung des Baues und der Unterhaltung der Telegraphenlinien, nebst

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einer Zusammenstellung aller auf die Telegraph-Correspondenz bezueglichen Bestimmungen der Telegraphen-Ordnung etc., einem Gebuehrentarif und einer mit Beispielen erlaeuternden Anleitung zur Abfassung und Behandlung der Telegramme. x+264 pp. ill. 8vo. *Berlin, 1882*
 Work on the electric telegraph for the general reader.

2301. **Tommasi, Donato.** Histoire des sciences sur la découverte de l'électro-magnétisme. (Cosmos-les-Mondes, Ser. IV, Vol. 5, pp. 326-328.) 8vo. *Paris, 1882*
 Romagnosi's discovery in 1802 of the deflection of a magnetic needle by the electrostatic effect of an electrode of a voltaic pile, p. 327. (See No. 974.)
 —See also 2263.
2302. **Urquhart, J(ohn) W.** Electro-motors: a treatise on the means and apparatus employed in the transmission of electrical energy, and its conversion into motive power, for the use of engineers and others. xii+178 pp. ill. pl. 8vo. *Manchester, 1882*
 Useful for the general reader though written for the electrical engineer.
 —See also 2216.
2303. **Webber, C(harles) E(dmund).** Telephonic communication. 18 pp. 4to. *London, 1882*
 The principle of the carbon transmitter, p. 4.
 —See also 3748.
2304. **Weber, Heinrich.** Der Rotationsinductor, seine Theorie und seine Anwendung zur Bestimmung des Ohm in absoluten Maassen. 76 pp. 2 plates. ill. L. 8vo. *Leipzig, 1882*
 The spinning coil and the determination of the ohm in absolute measure.
 —See also 1588.
2305. **Wiedemann, Gustav (Heinrich).** (1826-1899.) Die Lehre von der Elektricitaet, zugleich als dritte voellig umgearbeitete Auflage der Lehre vom Galvanismus und Elektromagnetismus. 4 vols. in 5. ill. 8vo. *Brunswick, 1882-1885*
 Comprehensive treatise on electricity.
 —See also 1537.
2306. **Wormell, Richard.** Magnetism and electricity, an elementary text-book for students. viii+260 pp. ill. 12mo. (High School Science Series.) *London, (1882)*
 Directions for laboratory work; construction of elementary apparatus.
2307. **A few practical remarks on the formation and use of de N. de Kabath's patent electric accumulators.** Second edition. ill. 8vo. *London, 1882*
 Paper of general information concerning storage batteries.
2308. **Abel, (Sir) F(rederic) A(ugustus).** (1827-1902.) Electricity applied to explosive purposes. (Lectures at Institut. Civil Engin. Vol. I. pp. 107-148.) 8vo. *London, 1883*
 Historical review of the subject; high and low tension fuses; electric mines; use of the induction coil; details of the Hell Gate (New York) explosion,

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Sept. 24, 1876. First application of the electric spark to the ignition of gunpowder wrongly attributed to Franklin, see Dr. Watson's Experiments and Observations, 1746. (See No. 333.)

—See also 1564, 2378, 3594.

2309. **Abernethy, J. P.** Modern service of commercial and railway telegraphy, in theory and practice arranged in questions and answers. Second edition. 318 pp. ill. 12mo. *Cleveland, 1883*
2310. **Ballantyne, R(obert) M(ichael).** (1825–1894.) The battery and the boiler; or, Adventures in the laying of submarine electric cables. vi+420 pp. 6 plates. 12mo. *London, 1883*
A humorous production.
2311. **Chaney, H(enry) J(ames).** (1842–1906.) Calculations of densities and expansions. 31 pp. L. 8vo. *London, 1883*
Weight of air, density of water at different temperatures, coefficients of expansion of solids.
2312. **Deprez, Marcel.** Expériences sur le transport et la distribution de la force par l'électricité. 32 pp. 4to. *Grenoble, 1883*
Details of the method employed in the transmission of electric energy and discussion of results obtained.
—See also 5454.
2313. **Du Moncel, Th(éodore) Achille Louis** (1821–1884) & **Frank Geraldry.** L'électricité comme force motrice. 304 pp. ill. pl. 12mo. (Bibliothèque des Merveilles.) *Paris, 1883*
Historical electro-motors: that of Elias and the dynamo of Pacinotti.
- 2313a.—(English translation.) Electricity as a motive power. Translated with additions by J. Wharton. vii+316 pp. 8vo. *London, 1883*
—See also 1223.
2314. **Fahie, J. Angelo.** On magneto and dynamo-electric machines. 37 pp. ill. 8vo. *Dublin, 1883*
Short account of various machines.
2315. **Fahie, J(ohn) J(oseph).** Honour to whom honour is due. Edward Davy and the electric telegraph. 1836–1839. (Extract, Electrician, Vol. 11.) 48 pp. ill. 8vo. *London, 1883*
The author's needle instrument and electro-chemical telegraph, patented in 1837–1838.
—See also 2354, 4220.
2316. **Fiske, Bradley A.** Electricity in theory and practice or the elements of electrical engineering. 270 pp. ill. pl. 8vo. *New York, 1883*
Work written for the general reader.
2317. **Fitzgerald, Geo(rge) Francis.** (1851–1901.) On the possibility of originating wave disturbances in the ether by means of electric forces. (Trans. Roy. Soc. Dublin, Vol. 1, pp. 133–134+173–176.) 4to. *Dublin, 1883*
Two short papers of a mathematical nature.
—See also 4078.

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2318. **Forcieri, Pietro.** La telegrafia elettro-tecnica, guida per la conoscenza a maneggio degli apparati telegrafici, principalmente di quelli a sistema Morse, Hughes, Wheatstone, Duplex e Meyer. vii+264 pp. ill. 8vo. *Turin, 1883*
Work intended for the telegraph operator.
2319. **Gladstone, J(ohn) H(all)** (1827-1902) & **Alfred Tribe** (1840-1885). The chemistry of the secondary batteries of Planté and Faure. xi+59 pp. 12mo. (Nature Series.) *London, 1883*
Research on the theory and action of accumulators.
—See also 1832.
2320. **Glaser-de Cew, Gustav.** Die magnetelektrischen und dynamo-elektrischen Maschinen und die sogenannten Secundaer-Batterien, mit besonderer Ruecksicht auf ihre Construction. xvi+263 pp. ill. 12mo. (Elektrotechnische Bibliothek, Vol. I.) *Vienna, 1883*
Early forms of dynamos briefly described; theory of the dynamo; storage batteries.
- 2320a.—(English translation.) Magneto and dynamo electric machines with accumulators. Translated by F. Krohn and specially edited with many additions by Paget Higgs. xiii+301 pp. ill. 8vo. (The Specialist's Series.) *London, 1884*
2321. **Greer, Henry.** Dictionary of electricity; or, The electricians handbook of reference; including recent electrical and technical terms, and descriptions of the late inventions of the Paris Electrical Exhibition, and of other new inventions in electricity and magnetism; with additions by W. L. Allison. 192 pp. ill. 12mo. *New York, 1883*
Short articles on electrical terms.
- 2322.—The storage of electricity. 42 pp. 8vo. *New York, 1883*
Contains a paper by Prof. S. P. Thompson; various storage batteries; chemistry of the storage battery.
2323. **Grierson, Thomas B.** Electric lighting by water-power. 44 pp. 8vo. *Dublin, 1883*
The use of waterfalls and wind-power in Ireland.
2324. **Hankel, W(ilhelm) G(ottlieb).** (1814-1899.) Elektrische Untersuchungen. XV. Abhandlung: Ueber die Aktino- und Piezoe-elektrischen Eigenschaften des Bergkrystalles und ihre Beziehung zu den Thermoelektrischen. (Abh. Saechs. Ges. Wiss. Math.-Nat. Kl., Vol. 12, pp. 459-547.) 4 plates. L. 8vo. *Leipzig, 1883*
Researches in thermo and in piezo-electricity with colored drawings of electrified crystals.
—See also 1524.

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2325. **Hedges, Killingworth.** The supply of electricity by local authorities. 31 pp. ill. 8vo. *London, 1883*
Distribution mains; generators; storage batteries, etc.
—See also 2149.
2326. **Holmes, A(rthur) Bromley.** Practical electric lighting. 154 pp. ill. 1 plate. 12mo. *London, 1883*
Simple explanation of the principles involved in the production and regulation of the light.
—See also 2284.
2327. **Hospitalier, Édouard.** (1852-1907.) Formulaire pratique de l'électricien. Years I. & II. 1883, 1884. ill. 12mo. *Paris, 1883-1884*
Handbook of instructions in electrical engineering.
- 2327a.—(English translation.) The electrician's pocket-book. The English edition of "Formules pratiques de l'électricien." Translated with additions by Gordon Wigan. xv+318 pp. ill. 12mo. *London, 1884*
—See also 2235.
2328. **Jacques, Ernest.** Dictionnaire d'électricité et de magnétisme, étymologique, historique, théorique, technique avec la synonymie française, allemande et anglaise. viii+281 pp. 8vo. *Paris, 1883*
The terms are given in French, German and English; the descriptive part is in French only.
2329. **Lockwood, Thomas (D).** Electrical measurement and the galvanometer, its construction and uses. iii+137 pp. ill. 12mo. *New York, 1883*
Electrical measurements involving the use of the galvanometer.
- 2330.—Electricity, magnetism and electric telegraphy, a practical guide and handbook. 377 pp. ill. 8vo. *New York, 1883*
Elementary treatment of the principles and practice of telegraphy and telephony.
—See also 2285.
2331. **Munro, J(ohn).** Electricity and its uses. xii+180 pp. ill. pl. 12mo. *London, (1883)*
Advances made in the applications of the electric current written for the wants of the general reader.
—See also 2370, 3696.
2332. **Rayleigh, (Lord) (John William Strutt).** Reprint of some physical papers.—An experiment to illustrate the induction on itself of an electric current. (Extract, Nature, Vol. 6, 1872.) 3 pp.—Vibrations of a liquid in a cylindrical vessel. (Extract, Nature, Vol. 12, 1875.) 3 pp.—Absolute pitch. (Extract, Nature, Vol. 17, 1877.) 5 pp.—On the determination of absolute pitch by the common harmonium. (Extract, Nature, Vol. 19, 1879.) 4 pp.—The photophone. (Extract, Nature,

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- Vol. 23, 1881.) 3 pp.—The soaring of birds. (Extract, Nature, Vol. 28, 1883.) 3 pp.—Distribution of energy in the spectrum. (Extract, Nature, Vol. 28, 1883.) 2 pp.—On the tension of mercury vapour at common temperature. (Extract, Report, British Ass. Adv. Sc., 1882.) 1 p.—On the absolute measurement of electric currents. (Extract, Report, British Ass. Adv. Sc., 1882.) 2 pp.—On the duration of free electric currents in an infinite conducting cylinder. (Extract, Report, British Ass. Adv. Sc., 1882.) 2 pp.—8vo. *London, 1883*
—See also 3793.
2333. **Schontjes**, H. Les grandeurs électriques et leurs unités. Second edition. 120 pp. ill. L. 8vo. *Gand, 1883*
Electrical units: theory.
2334. **Smith**, Willoughby. (1828–1891.) Volta-electric induction. 6 pp. Folio. (Proof-sheets.) *London, 1883*
Paper of general physical interest.
—See also 2006.
2335. **Steenackers**, F(rançois) F(rédéric). Les télégraphes et les postes pendant la guerre de 1870–1871. Fragments de mémoires historiques. 620 pp. 12mo. *Paris, 1883*
Part played by the pigeon-post, by balloons and the electric telegraph during the Franco-Prussian War.
2336. **Swift**, James A. The practical telegrapher, a manual of practical telegraphy and telegraphic construction. 187 pp. ill. 8vo. *New York, 1883*
2337. **Swinburne**, James. Practical electrical units popularly explained. 61 pp. 12mo. *London, 1883*
2338. **Thompson**, Silvanus P(hillips). Cantor lectures on dynamo-electric machinery. 54 pp. ill. L. 8vo. (Soc. Encour. Arts, Manuf. & Commerce.) *London, 1883*
These lectures were developed in the author's standard work on *Dynamo-Electric Machinery*. (See No. 2376.)
- 2339.—Philipp Reis, inventor of the telephone, a biographical sketch, with documentary testimony, translations of the original papers of the inventor and contemporary publications. ix+182 pp. ill. 2 plates. 8vo. *London, 1883*
Biography of Philipp Reis, his claim to be considered the inventor of the telephone maintained; together with much important telephonic matter.
- 2340.—The first telephone. (Extract, Proc. Bristol Natur. Soc.) 9 pp. ill. 8vo. *London, 1883*
The work of Philipp Reis.
—See also 2262.
2341. **Thomson**, (Sir) William (Lord Kelvin). (1824–1907.) Electrical units of measurement. 6 pp. 8vo. *London, 1883*
Abstract of a lecture delivered at the Institution of Civil Engineers, May 2, 1883. Work of Cavendish and Coulomb; much of our present nomenclature.

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- ture due to Sir Charles Bright and Latimer Clark; recovery of the centimeter.
—See also 1085.
2342. **Tommasi, Donato.** Recueil de quelques mémoires publiés pendant 1882 dans le *Cosmos-les-Mondes*. 18 pp. 8vo. *Saint-Denis, 1883*
Five short papers on electrical subjects.
—See also 2263.
2343. **Wetter, Rodolphe van.** La télégraphie optique. 65 pp. 1 plate. 8vo. *Antwerp, 1883*
The heliograph and electric light.
2344. **Wahl, William H(enry).** Galvanosplastic manipulations, a practical guide for the gold and silver electroplater and the galvanoplastic operator. 656 pp. ill. 8vo. *Philadelphia, 1883*
2345. **Die elektrische Revolution.** Populaer-wissenschaftlich dargestellt von einem Fachmann. 74 pp. 12mo. *Munich, 1883*
Short popular exposition of the applications of the electric current with bibliography.
2346. **Bignani, E(nrico).** L'elettricità e le sue applicazioni. 219 pp. ill. 12mo. *Milan, 1884*
General account of dynamos, motors, telephones.
2347. **Boggett, William.** Thoughts on the inter-dependence of water and electricity and cognate subjects. 21 pp. 8vo. *London, 1884*
Electricity in combination with oxygen and hydrogen are the three constituents of water.
- 2347a. — (Another edition.) 32 pp. 8vo. *London, 1884*
—See also 2227.
2348. **Bolton, (Sir) Francis.** (1831–1887.) London water supply. viii+245 pp. charts. 8vo. *London, 1884*
History and description of the London waterworks with maps, statistical tables, etc.
2349. **Bottone, S(elimo) R(omeo).** The dynamo, how made and how used. 73 pp. ill. 12mo. *London, 1884*
Instructions for making a hand-dynamo.
- 2349a. — Fourth edition. 73 pp. ill. 12mo. *London, 1887*
—See also 2431.
2350. **Bramwell, (Sir) Frederick.** (1818–1893.) Telephones. 32 pp. ill. 8vo. *London, 1884*
A lecture on the telephone including the phonograph and photophone.
—See also 2378, 4216.
2351. **Clausius, Rudolph Julius Emmanuel.** (1822–1888.) On the theory of the dynamo-electric machine. Translated by Paget Higgs. (Extract, Minutes Proc. Instit. Civil Engin. Vol. 75.) 16 pp. 8vo. *London, 1884*
Some fundamental dynamo equations; discussion and application.
—See also 1669.

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2352. **Coulomb**, (Charles Augustin). (1736-1806.) Mémoires relatifs à la physique. Vol. I. Poitier rédacteur. Collection de la Société Française de Physique. 6+414 pp. 8vo. *Paris, 1884*
Seven memoirs relating to electricity and magnetism. Coulomb's torsion balance, pp. 108-115; electric pendulum, pp. 116-146; Biot anticipated, p. 233.
—See also 490.
2353. **Daniell**, Alfred. Textbook of the principles of physics. xx+653 pp. ill. 8vo. *London, 1884*
Comprehensive manual of general physics.
2354. **Fahie**, J(ohn) J(oseph). History of electric telegraphy to the year 1837, chiefly compiled from original sources and hitherto unpublished documents. xix+542 pp. ill. pl. 12mo. *London, 1884*
Succinct history of static and dynamic electricity, electro-magnetism and magneto-electricity, with *bibliography of sympathetic telegraphy*. (See No. 4220.)
—See also 2315.
2355. **Gordon**, J(ames) E(dward) H(enry). (1852-1893.) Practical treatise on electric lighting. xv+228 pp. ill. pl. 8vo. *London, 1884*
Besides technical, there is much general matter relating to the development and application of electric energy.
—See also 2145.
2356. **Gore**, G(eorge). An improved thermo-electric pile for measuring small electromotive forces. (Proc. Birmingham Philos. Soc., Vol. 4, pp. 129-132.) 8vo. *Birmingham, 1884*
Description of the apparatus with remarks on its usefulness.
- 2357.—The utility and morality of vivisection. 32 pp. 8vo. *London, 1884*
Plea for physiological experiments on animals.
—See also 1357.
2358. **Gray**, Andrew. Absolute measurements in electricity and magnetism. xiv+207 pp. ill. 12mo. *London, 1884*
Laboratory manual: theory and practice.
- 2358a.—Second edition, revised and greatly enlarged. xix+384 pp. ill. 12mo. *London, 1889*
2359. **Hammond**, Robert. The electric light in our homes. xii+188 pp. ill. pl. 12mo. *London, (1884)*
Popularly written work on general electric illumination.
2360. **Heap**, D(avid) P(orter). Electrical appliances of the present day; being a report on the Paris Electrical Exhibition of 1881. 287 pp. ill. pl. 8vo. *New York, 1884*
Description of batteries, dynamos, arc and incandescent lamps, lighthouses, military telegraphs, torpedo apparatus.
2361. **Hillairet**, A. Transmission électrique du travail mécanique. Détermination des éléments de la transmission. 78 pp. L. 8vo. *Paris, 1884*
Theoretical considerations relating to the electric transmission of power.

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2362. **Hopkinson, John.** (1849-1898.) On the theory of alternating currents, particularly in reference to two alternate current machines connected to the same circuit. 9 pp. Folio. (Proof-sheets.) 1884
The subject is treated mathematically.
—See also 2378, 3877.
2363. **Joule, James Prescott.** (1818-1889.) Scientific papers; published by the Physical Society of London. 2 vols. ill. pl. tab. 8vo. London, 1884-1887
This important collection contains papers on the mechanical equivalent of heat; on magnetism, electro-magnetism, magnetic and electro-magnetic forces, and electro-calorimetry; also the various determinations of the "mechanical equivalent" of heat.
—See also 2918.
2364. **Lock, C(harles) G(eorge) Warnford.** Workshop receipts for the use of manufacturers, mechanics and scientific amateurs. xvi+480 pp. ill. 12mo. (Spon, Ernest. Workshop receipts. Third series.) London, 1884
2365. **Lodge, (Sir) Oliver J(oseph).** On the seat of the electromotive forces in the voltaic cell. 70 pp. ill. 8vo. London, 1884
Extensive treatment of the subject.
—See also 2439, 3827.
2366. **Lupton, Sydney.** Numerical tables and constants in elementary science. xv+96 pp. map. tab. 12mo. London, 1884
Tables of physical and chemical constants.
2367. **Lynd, William.** Practical telegraphist and guide to the telegraph service. 227 pp. ill. 12mo. London, (1884)
Useful compilation of telegraph matter.
2368. **Mach, T. von.** Technisches Woerterbuch fuer Telegraphie und Post; deutsch-franzoesisch und franzoesisch-deutsch. 395 pp. 8vo. Berlin, 1884
Dictionary of electro-technical terms in German-French and French-German.
2369. **May, Gustav.** Die Weltliteratur der Elektricitaet und des Magnetismus von 1860-1883, mit besonderer Beruecksichtigung der Elektro-Technik. Mit Sachregister von O. Salle. xiii+203 pp. 12mo. (Hartleben Collection, Elektrotechnische Bibliothek, Vol. XX.) Vienna, 1884
List of works on electricity covering the period 1860-1883 with bibliographical note following some titles.
- 2369a.—(English edition.) A bibliography of electricity and magnetism, 1860-1883. With special reference to electro-technics. With an index by O. Salle. viii+203 pp. 12mo. London, 1884
2370. **Munro, John & Andrew Jamieson.** Pocketbook of electrical rules and tables for the use of electricians and engineers. 480 pp. ill. 32mo. London, 1884
—See also 2236, 2331.

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2371. **Murdock, J(oseph) B(allard).** Notes on electricity and magnetism, designed as a compendium to S. P. Thompson's elementary lessons. viii+139 pp. ill. 12mo. *New York, 1884*
Proofs of important formulæ. (See No. 2262.)
—See also 4190.
2372. **Prescott, George B(artlett).** (1831-1894.) Dynamo-electricity; its generation, application, transmission, storage and measurement. xii+867 pp. ill. pl. 8vo. *New York, 1884*
Electrical engineering in theory and practice.
—See also 1497.
2374. **Swinton, Alan A. Campbell.** The principles and practice of electric lighting. viii+172 pp. ill. 12mo. *London, 1884*
Written for the general reading public.
2375. **Ternant, A. L.** Les téléphones. Agencement des bureaux téléphoniques dans les grands centres.—Construction des lignes et exploitation.—Auditions téléphoniques musicales.—Fanfare ader. 64 pp. ill. 8vo. *Marseille, 1884*
The telephone and telephone-exchanges; claims of Charles Bourseul 1854, and Philipp Reis, 1861. Elisha Gray and Alexander Graham Bell took their patents in 1876.
—See also 1756.
2376. **Thompson, Silvanus P(hillips).** Dynamo-electric machinery, a manual for students of electrotechnics. xii+408 pp. ill. 8vo. *London, 1884*
First edition of a standard work for the use of electrotechnical students. (See No. 2338.)
- 2376a.—Second edition, enlarged. xvii+527 pp. ill. 8vo. *London, 1886*
—See also 2262.
2377. **Turner, H(enry) F(yers).** Notes on military telegraph instruments with diagrams of connections. vi+25 pp. 33 plates. 12mo. *1884*
The diagrams form a special feature of the booklet.
2378. **Institution of Civil Engineers.** The practical applications of electricity. A series of lectures delivered at the Institution of Civil Engineers, Session 1882-1883. iv+181 pp. ill. 2 plates. 8vo. *London, 1884*
The progress of telegraphy by Sir William Henry Preece; Telephones by Sir Frederick Bramwell; the electric transmission and storage of power by Dr. Charles Siemens; some points in electric lighting by Dr. John Hopkinson; electricity applied to explosive purposes by Prof. Frederic Augustus Abel. Electrical units of measurement by Sir William Thomson (Lord Kelvin).
—See also 1085, 1497, 1654, 2308, 2350, 2362.
2379. **Blakesley, Thomas H(olmes).** Alternating currents of electricity. 90 pp. 8vo. (Reprinted from papers published in the Electrician.) *London, 1885*
Geometrical methods applied to problems involving the flow of electricity, subject to harmonic variation.
—See also 5331.

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2380. (Boggett, William.) Facts proving that lightning is a composite force. 12 pp. 8vo. *London, 1885*
Electricity is one of the constituents of water, p. 1, and is the true source of life, p. 11.
—See also 2227.
2381. Fontaine, Hippolyte. Electrolysis, a practical treatise on nickeling, coppering, gilding, silvering the refining of metals and treatment of ores, by means of electricity; translated from the French by J. A. Berly. xii+256 pp. ill. 8vo. *London, 1885*
Batteries and electric generators used in electro-metallurgy.
—See also 2027.
2382. Hospitalier, É(douard). (1852–1907.) Domestic electricity for amateurs, translated from the French, with additions by C. J. Wharton. viii+229 pp. ill. pl. 8vo. *London, 1885*
General instructions about electric bells, clocks, telephones; also electroplating, gilding, etc.
—See also 2235.
2383. Houston, E(dwin) J(ames), A. E. Baines & C. H. W. Biggs. Primers of electricity. 29 lectures. Second edition. ill. 8vo. *London, 1885*
Information of a general, practical character.
—See also 2438.
2384. Jamieson, Andrew. Electric lighting for steamships, with an abstract of the discussion upon the paper; edited by James Forrest. 97 pp. ill. pl. 8vo. *London, 1885*
Selection of dynamo and methods of driving; arc and glow lamps; discussion by Preece, Swan, Mance, Siemens and others.
—See also 2236.
2385. Lane, Denny. On the elementary principles of the gas-engine. 20 pp. 8vo. *(London) 1885*
Application of the second law of thermodynamics, efficiency indicator diagrams; the passing of the steam-engine.
2386. Madsen, C(hristian) L(udwig). On forskellige lednings-systemer i store telefonanlaeg. 21 pp. L. 8vo. *Copenhagen, 1885*
Short pamphlet on electric telephony.
—See also 2037.
2387. Marchese, E(ugenio). Traitement électrolytique des mattes cuivreuses au Stolberg. 64 pp. 8vo. *Genoa, 1885*
Electrolytic refinement of copper.
—See also 4232.
2388. Maver, William (Jr.), & M. M. Davis. The quadruplex; with chapters on the dynamo-electric machine in relation to the quadruplex, the practical working of the quadruplex, telegraph repeaters, and the Wheatstone automatic telegraph, by Wm. Maver, Jr. 128 pp. ill. L. 8vo. *New York, 1885*
Description of the Edison quadruplex-system of telegraphy, written for operators.

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2389. **Rowell, George A**(ugustus). Electric meteorology; on the cause of terrestrial magnetism; on the cause of the change of the declination of the magnetic needle; on electric meteorology as connected with forestry. 17 pp. pl. 8vo. *Oxford, 1885*
Short paper on earth-currents as a cause of terrestrial magnetism; the earth is a vast hydro-electric machine.
- 2389a.—Electric meteorology; what is gas? How the theory was worked up. An appendix, 1884. 16 pp. 8vo. *Oxford, 1885*
Height of aurorae, p. 15.
—See also 1465.
2390. **Smith, Willoughby.** (1828–1891.) Induction and conduction. 21 pp. ill. 8vo. *(London), 1885*
General considerations on electrostatic induction.
- 2391.—**Magnetism.** 45 pp. ill. 8vo. *(London), 1885*
General facts of magnetism with beautiful representation of magnetic fields. The paper was written in 1885 while the author held the position of electrician to "The Telegraph Construction and Maintenance Company."
—See also 2006.
2392. **Spon, Ernest.** Workshop receipts for manufacturers, mechanics, and scientific amateurs. iv+450 pp. 12mo. *London, 1885*
—See also 2213.
2393. **Spry, William J**(ames) **J**(oseph). Engineer's, officer's watch, station, quarter, and fire bills, with notes on electricity and electric lighting. 93 pp. 12mo. *Portsmouth, 1885*
Notes on electric lighting.
2394. **Stephen, Vincent.** Wrinkles in electric lighting. ix+45 pp. ill. 12mo. *London, 1885*
Simple instructions written for engineers on board ship.
2395. **Turner, H**(erbert) **H**(all). Collection of examples on heat and electricity. 75 pp. 12mo. *London, 1885*
The examples are of an advanced mathematical character.
2396. **Urbanitzky, Alfred von.** Les lampes électriques et leurs accessoires, édition française par George Fournier. xvi+216 pp. ill. 16mo. (Bibliothèque des Actualités Industrielles, No. IV.) *Paris, 1885*
Technics of the principal arc and glow lamps.
—See also 2417.
2397. **Vivarez, Henry.** Construction des réseaux électriques aériens en fils de bronze silicieux: Lignes télégraphiques, téléphones; transport de force; lumière électrique. Second edition, revised (entièrement refondue). 175 pp. 1 plate. 8vo. *Paris, 1885*
Use of bronze and alloys for telegraph lines.
2398. **Watson, H**(enry) **W**(illiam) & **S. H. Burbury.** Mathematical theory of electricity and magnetism. 2 vols. 8vo. *Oxford, 1885–1889*
Written for advanced mathematical students.

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2399. Williams, W. Manual of telegraphy. xxii+327 pp. ill. 8vo.
London, 1885
Book of reference for telegraphic matters.
2400. Woodward, C(harles) J(osiah). Arithmetical physics; magnetism and electricity. (Degree and Honour Stages.) 52 pp. ill. 12mo.
London, (1885)
A primer of electricity.
—See also 2014.
2401. Franklin Institute. Report on the efficiency and duration of incandescent electric lamps. (Franklin Institute, Report.) 127 pp. 1 plate. ill. 8vo.
Philadelphia, 1885
Extensive paper giving methods and numerical results.
2402. Institution, Civil Engineers. Lectures on heat in its mechanical applications. (Institution of Civil Engineers, Session 1883-1884.) 236 pp. 4 plates. 8vo.
London, 1885
Thermodynamics by Prof. Osborne Reynolds; gas and caloric engines by Prof. Fleeming Jenkin; heat action of explosives by Captain Andrew Noble.
—See also 1677, 4025.
2403. Baker, W. G. Magnetism and electricity, a specific subject of instruction in public elementary schools. 144 pp. ill. 12mo. (Blackie's Elementary Text-books.)
London, (1886?)
Primer of electricity and magnetism.
2404. Boggett, William. Electricity analyzed. ii+24 pp. 8vo.
London, 1886
Facts showing, according to the author, that water always contains electricity.
—See also 2227.
2405. Cumming, Linnaeus. Electricity treated experimentally for the use of schools and students. xiii+389 pp. ill. 12mo.
London, 1886
A deservedly popular handbook.
—See also 1971.
2406. Fleming, J(ohn) A(mbrose). Short lectures to electrical artisans; being a course of experimental lectures delivered to a practical audience. viii+208 pp. ill. 12mo.
London, 1886
Popular work containing much general information; description and use of the author's potentiometer.
—See also 2437.
2407. Gordon, J(ames) E(dward) H(enry). (1852-1893.) School electricity. xii+262 pp. ill. 12mo.
London, 1886
Account of the experiments of Prof. Bjerknes on fields of force.
—See also 2145.
2408. Gore, G(eorge). On "Resistance" at the surfaces of electrodes in electrolytic cells. (Proc. Birmingham Philos. Soc., Vol. 5, pp. 1-8.) 8vo.
Birmingham, 1886
Phenomena of "transfer resistance" not due to polarization.
- 2408a.—Evidence respecting the reality of "transfer resistance" in electrolytic cells. (Proc. Birmingham Philos. Soc., Vol. 5, pp. 26-33.) 8vo.
Birmingham, 1886
An electric resistance differs from that of polarization and conduction.

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- 2408b.—Relations of surface-resistance at electrodes to various electrical phenomena. (Proc. Birmingham Philos. Soc., Vol. 5, pp. 36-44.) 8vo. *Birmingham, 1886*
A difference of transfer-resistance cannot produce a current.
- 2409.—On the Peltier effect at different temperatures. (Proc. Birmingham Philos. Soc., Vol. 5, pp. 53-56.) 8vo. *Birmingham, 1886*
The results given are in agreement with Tait's thermo-electric diagram.
—See also 1357.
2410. Henry, Joseph. (1797-1878.) Scientific writings. 2 vols. ill. L. 8vo. *Washington, 1886*
This record of a life-work of research in all branches of physical knowledge is divided into two periods, the first from 1824 to 1846 during the 22 years of the author's professorial career; and the second from 1847 to 1878 during his directorship of the Smithsonian Institution. The papers are arranged chronologically.
—See also 1002.
2411. Kapp, Gisbert. Electric transmission of energy and its transformation, subdivision and distribution. xi+331 pp. ill. pl. 8vo. (The Specialist's Series.) *London, 1886*
General principles of electrical engineering with special reference to the transmission of energy.
—See also 4299.
2412. Luce, Robert. Electric railways and the electric transmission of power described in plain terms. 106 pp. ill. 1 plate. 12mo. *Boston, 1886*
Includes notes on electricity on elevated roads; telpherage.
2413. McGregor, W(illiam). Loss of life and property by lightning at home and abroad. Plea for inaugurating a new and responsible "Society for the protection of life and property from lightning." 26 pp. 8vo. *Bedford, 1886*
Scope of the Society for the protection of life and property from lightning with some relevant matter.
—See also 1945.
2414. Nipher, Francis E(ugene). Theory of magnetic measurements, with an appendix on the method of least squares. 94 pp. portr. ill. 12mo. *New York, 1886*
Prepared specially for use in magnetic-surveys.
—See also 3834.
2415. Schilling, N. H. The present condition of electric lighting. 55 pp. 8vo. *Boston, 1886*
Special reference to affairs in Munich; some points in the physics of electric light.
2416. Tarn, H. C. Magnetism and electricity. viii+184 pp. ill. 12mo. *London, 1886*
Prepared as a text-book for elementary examinations.
2417. Urbanitzky, Alfred von. Electricity in the service of man; a popular and practical treatise on the applications of electricity

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- in modern life; from the German. Edited with copious additions by R. Wormell, with an introduction by John Perry. xxx+869 pp. ill. pl. 8vo. *London, 1886*
 Written for the general as well as the more technical reader.
 —See also 2396.
2418. Walker, Frederick W. Practical dynamo-building for amateurs. 63 pp. ill. 12mo. *London, 1886*
 Short instructions followed by notes on lamps and on storage batteries.
2419. Ayrton, W(illiam) E(dward). Practical electricity, a laboratory and lecture course for first year students of electrical engineering. xvi+516 pp. ill. 12mo. *London, 1887*
 —See also 1791.
2420. Crookes, (Sir) William. Genesis of the elements. 28 pp. 8vo. *London, 1887*
 Special reference to the author's work on yttria; speculation concerning protyle; atomic nature of electricity.
 —See also 3389.
2421. Hering, Carl. Practical directions for winding magnets for dynamos. 63 pp. ill. 12mo. *London, 1887*
 The author's method of calculating the windings of field-magnets.
2422. Jeans, William T. Lives of the electricians, Professors Tyndall, Wheatstone, and Morse. Series I. xvi+327 pp. 12mo. *London, 1887*
 Interesting account of the life and work of electrical pioneers.
2423. Mendenhall, Thomas C(orwin). A century of electricity. 229 pp. ill. diags. 12mo. *Boston, 1887*
 Sketch of the growth of the science of electricity and its principal applications in the nineteenth century.
2424. Nicol, Donald. The telegraph and telephone considered in relation to economy and efficiency. 32 pp. L. 8vo. *London, 1887*
 The paper advocates the use of bitumen for insulation purposes.
2425. Planté, (Raymond Louis) Gaston. (1834-1889.) The storage of electrical energy and researches on the effects created by currents combining quantity with high tension; translated from the French by Paul Bedford Elwell. 268 pp. portr. ill. 12mo. *London, 1887*
 Researches of the author extending over a period of twenty years.
 —See also 2162.
2426. Robinson, Henry. Hydraulic power and hydraulic machinery. xiv+190 pp. ill. 43 plates. 8vo. *London, 1887*
 Text-book for hydraulic engineers.
2427. Smith, Frederick John. On some new forms of work-measuring machines as applied to dynamos and electro-motors. 32 pp. 1 plate. ill. 12mo. *London, 1887*
 Note on dynamometers in general; the transmission ergometer.

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2428. **Stewart**, Balfour (1828-1887) & W(illiam) W(inson) H(aldan) Gee. Lessons in elementary practical physics. Vol. II. ill. 12mo. *London, 1887*
Vol. II. Practical measurements in electricity and magnetism.
—See also 1925.
2429. **Belloc**, Alexis. La télégraphie historique depuis les temps les plus reculés jusqu'à nos jours. xi+343 pp. ill. L. 8vo. *Paris, 1888*
A considerable part of the book is devoted to the history of the mechanical telegraph. The remainder treats briefly of the electric telegraph and telephone together with their uses for military purposes.
2430. **Boggett**, William. Key to the mysteries of water, electricity and heat. 70 pp. 12mo. *London, 1888*
The composition of water and its use for the preservation of health.
—See also 2227.
2431. **Bottone**, S(elimo) R(omeo). Electrical instrument-making for amateurs. A practical handbook. Second edition. 183 pp. ill. 12mo. *London, 1888*
Serviceable book of instructions.
—See also 2349.
2432. **Hedges**, Killingworth. Central-station electric lighting with notes on the methods used for the distribution of electricity. vii+128 pp. ill. plate. 12mo. *London, (1888)*
—See also 2149.
2433. **Pope**, Franklin Leonard. (1840-1895.) American inventors of the telegraph. (Extract, The Century, New Ser., Vol. 13, pp. 924-944.) ill. 8vo. *London, 1888*
Clear statement of Vail's claims to be considered the *co-inventor* with Morse of electric telegraphy.
—See also 1753.
2434. **Boggett**, William. Life, what it is sustained by, and cognate subjects. 56 pp. 12mo. *London, 1889*
The author believes that "without heat there is no electricity and no electricity without heat," p. 35.
—See also 2227.
2435. **Brown**, Harold P. Comparative danger to life of the alternating and continuous electrical currents. 61 pp. ill. 8vo. *New York, 1889*
"The nature of the alternating current is such that no possible precautions can afford protection to life except the limitation of the pressure to 300 volts;" electrocution experiments on dogs, calves, etc.
- 2436.—Electrical distribution of heat, light and power, with partial list of deaths from electrical lighting apparatus, and address by John Murray Mitchell, on legislative control of dangerous electrical currents. 48 pp. 12mo. *New York, 1889*
The pamphlet contains illustrations showing the water-analogues of the series arrangement of lamps, the multiple-arc, the three-wire system, etc.

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2437. Fleming, J(ohn) A(mbrose). The alternate current transformer in theory and practice. Vol. I. ill. 8vo. *London, 1889*
The history and practice of the alternate-current transformer.
—See also 2406.
2438. Houston, Edwin J(ames). Dictionary of electrical words, terms and phrases. iv+640+15 pp. ill. 12mo. *New York, 1889*
Book of reference; numerous diagrams and illustrations.
—See also 2383, 4269.
2439. Lodge, (Sir) Oliver J(oseph). Modern views of electricity. xvi+422 pp. ill. 12mo. (Nature Series.) *London, 1889*
Important contribution to our knowledge of the mechanism of the electric current and the phenomena of the ether.
—See also 2365.
2440. Badt, F(rancis) B. & H(enry Smith) Carhart. Derivation of practical electrical units. With twelve illustrations. 56 pp. port. tabl. 12mo. *Chicago, 1890*
Biographical sketches of famous electricians; remarks on the electrical units.
2442. Dearlove, Arthur L. Tables to find the working speed of cables; comprising also data as to diameter, capacity, and copper resistance of all cores. 20 pp. 32mo. *London, 1890*
The tables for speed of signaling are based on the mean results obtained in working certain long cables.
2443. Langdon(-Davies), (Charles). An explanation of the phonopore and more especially of the simplex phonopore telegraph. Printed in English and French. 68 pp. ill. 4to. *London, 1891*
Results and means by which they were obtained; the features of the system briefly described by Conrad W. Cooke.
—See also 5501.
- 2444†. Pacinotti, Antonio (b. 1841.) (Autograph letter and memoranda, sketches and photographic portraits.) 9 items. 1892
Material furnished to Franklin L. Pope to assist in the preparation of an article which appeared with the title, "The Genesis of the Modern Dynamo: Antonio Pacinotti," in the *Electrical Engineer*, New York, in the issues dated Sept. 21, Sept. 28, Oct. 5 and Oct. 12, 1892. Included are photographs of Prof. Luigi Pacinotti (father) and of Prof. Antonio Pacinotti; the latter, taken in 1863 or 1864, and the former, in 1882.
—See also 1601.
- 2444† bis. Colladon, (Jean) Daniel. (1802-1893.) Recherches et expériences sur l'électricité. Huit notices, publiées de 1825 à 1837. 2+11+3+2+9+4+3+3 pp. 4to. *Geneva, 1893*
1. (Prevost and Colladon.) Note on the Arago disk. 1826.—2. Effect produced on magnetic needle by current from static machine and from clouds, with comment from *Le Globe*. 1826.—3. (Ampère and Colladon.) Note on Arago disk. 1826.—4. Experiment on electro-magnetic induction made in 1825.—5. Experiment on atmospheric electricity. 1826-1828.—6. Experiments on the electric eel. 1831. (Abstract by Arago, with an appendix relating to experiments on the same subject by Du Bois-Reymond, 1884.)—7. Frictional electricity developed in weaving. 1826.—8. Terrestrial currents in railroad tracks and on the shore of the sea, rivers, etc. 1837.

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The experiment on electromagnetic induction (No. 4) anticipated that of Faraday, but the result was negative for the reason that the galvanometer was not of a type to respond to instantaneous current effects and Colladon states he did not suspect that the induction had only an instantaneous effect.
—See also 547, 915, 1825.

2445. **Cooke, Conrad William.** Automata old and new. 117 pp. ill. pl. 12mo. *London, 1893*

One of the *sette of odd volumes*; description of famous automata, followed by bibliography. Only 255 copies printed. (Chiswick Press.)

- 2445† bis. **Paracelsus.** (1493–1541.) The hermetic and alchemical writings of Aureolus Philippus Theophrastus Bombast, of Hohenheim, called Paracelsus the Great. Now for the first time translated into English. Edited by Arthur Edward Wright. 2 vols. xvi+394+396 pp. 4to. *London, 1894*

The few references made to the properties of the magnet are gross absurdities. Several prescriptions given for wounds and ulcers include powdered lodestone. Gilbert in *De Magnete* expresses contempt for Paracelsus.

- 2446†. **Benjamin, Park.** The intellectual rise in electricity. A History. 611 pp., frontispiece portrait of Gilbert, ill. 8vo.

New York, 1895

Work of research beginning with the earliest recognized phenomena of electricity and magnetism and ending with the electrical experiments and practical work of Benjamin Franklin. Dr. Park Benjamin's collection now in the Library of the U. S. Naval Academy, Annapolis, Md., contains many of the choice and some of the rare works on electricity and magnetism. His quotations are for the most part from the earliest editions.

2447. **Bright, Edward Brailsford & Charles Bright.** Life story of the late Sir Charles Tilston Bright (1832–1888), civil engineer; with which is incorporated the story of the Atlantic cable, and the first telegraph to India and the colonies, by his brother E. B. Bright and his son C. Bright. 2 vols. portr. ill. pl. facsim., tabl., diagr. 8vo. *Westminster, (1899)*

Interesting matter relating to the construction, laying and working of the early Atlantic cables with maps and numerous illustrations.

—See also 1316, 4461.

- 2447† bis. **Wilde, Henry.** Correspondence in the matter of the Society of Arts and Henry Wilde, D. Sc., F.R.S., on the award to him of the Albert Medal, 1900, and on the invention of the dynamo-electric machine. 23 pp. 4to. *Manchester, 1900*

A curious controversy. Wilde not only refused to accept an Albert Medal, awarded to him by the Society of Arts, on the ground that the terms of the award did not specifically state that he was the inventor of the dynamo-electric machine, but actually instituted legal proceedings against the Society to restrain the publication of the award!

—See also 3524.

- 2447† bis. **Hellmann, G.** Ueber die Kenntniss der magnetischen Deklination vor Christoph Columbus. (Extract, Meteorologische Zeitschrift, vol. 4, 1906.) 5 pp., 1 plate. 8vo. *Berlin, 1906*

Describes and illustrates a pocket sun-dial fitted with a compass, on the face of which is indicated the variation of the magnetic meridian. The dial which

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is now in the Museum Ferdinandeum in Innsbruck, is supposed to have been made in Nuremberg and bears the date of 1451. This dial leads Dr. Hellmann to believe that magnetic variation was known and measured long before Columbus made his first voyage to America.

Dr. Hellmann, of Berlin, is editor of a series of reprints published by A. Asher, Berlin, of rare early publications on meteorology and terrestrial magnetism. Among these are the following:—No. 4. *Die aeltesten Karten der Isogonen, Isoklinen, Isodynamen*: E. Halley, W. Whiston, J. C. Wilcke, A. v. Humboldt, C. Hansteen. 1701-1826.—No. 9. *A discourse mathematical on the variation of the magneticall needle*: Henry Gellibrand, London, 1635.—No. 10. *Rara Magnetica*: P. De Maricourt, F. Falero, P. Nunes, J. De Castro, G. Hartman, M. Cortés, G. Mercator, R. Norman, W. Borough, S. Stevin. 1269-1599.—No 11. *Ueber Luftelektricität*: J. H. Winkler, B. Franklin, T. F. Dalibard, L. G. Le Monnier. 1746-1753.

The Library has received too late for entry, two reprints from *Terrestrial Magnetism* (Washington), by Dr. Hellmann, as follows: 1. The Beginnings of Magnetic Measurements (June, 1899). This is a translation from *Zeitschrift der Gesellschaft für Erdkunde*, Bd. 32, Heft 2, with some additions by the author, but not including an appendix to the German article. Its subject relates to the measurement of the magnetism of the earth. 2. Zur Bibliographie von W. Gilbert's *De Magnete*. (June, 1902.) Includes a list of recorded sales prices of the several editions of *De Magnete*. The London folio (1600) was published at 7 shillings, sixpence.

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